

PERSONNEL ISSUES, LARGE AND SMALL SYSTEMS

INPUT

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OFFICES

Headquarters

1943 Landings Drive
Mountain View, CA 94043
(415) 960-3990
Telex 171407

Detroit

220 E. Huron
Suite 209
Ann Arbor, MI 48104
(313) 971-0667

New York

Park 80 Plaza West-1
Saddle Brook, NJ 07662
(201) 368-9471
Telex 134630

United Kingdom

INPUT, Ltd.
Airwork House
35 Piccadilly
London, W1V 9PB
England
01-439-8985
Telex 23116

AUTHOR

Personnel Issues, Large and

TITLE

Small Systems

F-LS3
1983

F-LS3
1983

Italy
Milan 284-2850
Telex 310352

D-6380 Bad Homburg
West Germany
Telex 418094

Data Service Company, Ltd.
Building
Kita Aoyama
Minato-ku
7

090
37

consult
on & Co AB
4
Stockholm

20
41

many
ON GmbH
ethenbrunnen 1


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PERSONNEL ISSUES, LARGE
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PERSONNEL ISSUES, LARGE AND SMALL SYSTEMS

ABSTRACT

This report discusses the changing role of the field engineer as it is affected by technological advances and the field service organization's development from cost center to profit center. Skill mix and compensation requirements are presented as a reflection of this changing role.

Over 27 large- and small-system vendors were interviewed concerning their present and future personnel administration practices and procedures.

This report contains 104 pages, including 38 exhibits.

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I INTRODUCTION

I INTRODUCTION

- This report is produced by INPUT as part of the 1983 Field Service Program for the United States, for clients of that program.
- As the demand for computer equipment continues to increase, so will the need for maintenance of that equipment. The need for both entry-level and qualified maintenance staff will grow dramatically. With this growth, the recruitment and retention of field service employees will become a crucial issue for vendors.
- A second issue will be the growing concern about cost effectiveness within field service organizations. As more and more field service operations are treated as potential profit centers, vendors will look at personnel management as a way of reducing costs and improving service.
- For these reasons, INPUT has produced two detailed reports. One report groups the data for large-system vendors with that for small-system vendors; the other combines peripheral/terminal vendor data with that for office product vendors.
- This report deals specifically with large- and small-system vendors, although industry-wide trends and issues have been covered where applicable.

A. DEMOGRAPHICS/METHODOLOGY

- A total of 7 large-system vendors, 20 small-system vendors, 21 peripheral/terminal vendors, and 11 office product vendors were interviewed between July and September, 1983. Interviews were completed on-site, over the telephone, and by return mail. Exhibit I-1 provides a list of vendors interviewed.
- Vendors were interviewed concerning their personnel management activities, both current and future. The basis of the vendor interview was the questionnaire shown in the Appendix. In addition, client comments and opinions were solicited.

B. METHODOLOGY

- To prepare this report, survey results have been combined with extensive ongoing research at INPUT and in the industry.
- The objective was to determine the trends in personnel skill mix, and total compensation and management, in light of the most recent developments in the field service marketplace. These developments include the absorption of software support into the hardware support organization, growth of support centers, remote diagnostics, and the trend towards off-site repair (e.g., swapping boards at the customer site and repairing them at a repair center).
- Field service is predominantly a people-based service and the individual skills, capabilities, and attitudes of each field engineer determine the efficiency, image, and role that the service organization can accomplish.
- This report seeks to outline the goals and trends of vendors active in the large- and small-system marketplaces.

EXHIBIT I-1
VENDORS INTERVIEWED

COMPANY NAME	LARGE SYSTEM	SMALL SYSTEM	PERIPHERAL/ TERMINAL	OFFICE PRODUCT
3M				●
Ampex Corp.			●	
Anderson Jacobson, Inc.			●	●
Apple Computer, Inc.				●
Astrocom Corp.		●		
BTI Computer Systems		●		
Bell & Howell Co.			●	●
Braegen Corp.			●	
CPT Corp.				●
Calcomp		●	●	
Calma Co.		●		
Cambex Corp.	●			
Compugraphics Corp.		●		
Computer Automation, Inc.		●		
Consultants Field Engineering		●		
Control Data Corp.	●	●	●	
Cray Research, Inc.	●			
Diablo Systems, Inc.			●	
Digital Equipment Corp.	●	●	●	
Exxon Office Systems Co.				●
Floating Point Systems, Inc.	●			
Four-Phase Systems, Inc.		●		
General Electric Information Services Co.		●		

EXHIBIT I-1 (Cont.)
VENDORS INTERVIEWED

COMPANY NAME	LARGE SYSTEM	SMALL SYSTEM	PERIPHERAL/ TERMINAL	OFFICE PRODUCT
General Datacomm Services Corp.		●		
Harris Corp.		●		
ISC Systems Corp.			●	
ITT			●	●
Indeserve, Inc.		●	●	
Itek Graphic Systems, Inc.			●	
Memorex Corp.			●	
Mohawk Data Sciences Corp.			●	●
National Advanced Systems, Inc.	●	●	●	
Northern Telecom, Inc.			●	●
Perkin Elmer Corp.	●			
Q1 Corp.		●		
Rapicom, Inc.				●
Rolm Corp.				●
Scan-Data Corp.		●		
Siemens Corp.			●	
Stratus Computer Inc.		●		
Systems Integrators, Inc.			●	
TRT Data Products			●	
TRW			●	
Telex Computer Products, Inc.			●	
Texas Instruments, Inc.		●		
Triad Systems Corp.		●		
Totals	7	20	21	11

II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

A. OVERVIEW

- A vital factor in the successful administration of personnel is the creation of both short-term and long-term plans outlining the profile of the work force. This profile should address the number of people needed in each job category, the skills necessary within each job category, and the individual worker characteristics needed for each job category.
- In field service personnel management, the outlining of these profiles should then be matched with the overall profile of the company. In this fashion, the service needs, as affected by such changes as new product releases or discontinued-product announcements, can be effectively planned for, rather than treated on a contingency basis.
- By matching present and future product mixes with the present and future skill mixes, the field service organization can achieve two objectives:
 - Reduce the likelihood of either too few, or too many qualified engineers in relation to the functional skill mix needed in the field.
 - Reduce the likelihood of having staff with the wrong skills in relation to the product mix present in the field.

- By achieving the objectives listed above, field service managers will develop more efficient organizations. Since labor is the largest component of field service costs, efficient allocation of staff resources is crucial to long-term field service profitability.

B. PERSONNEL MANAGEMENT CHALLENGES

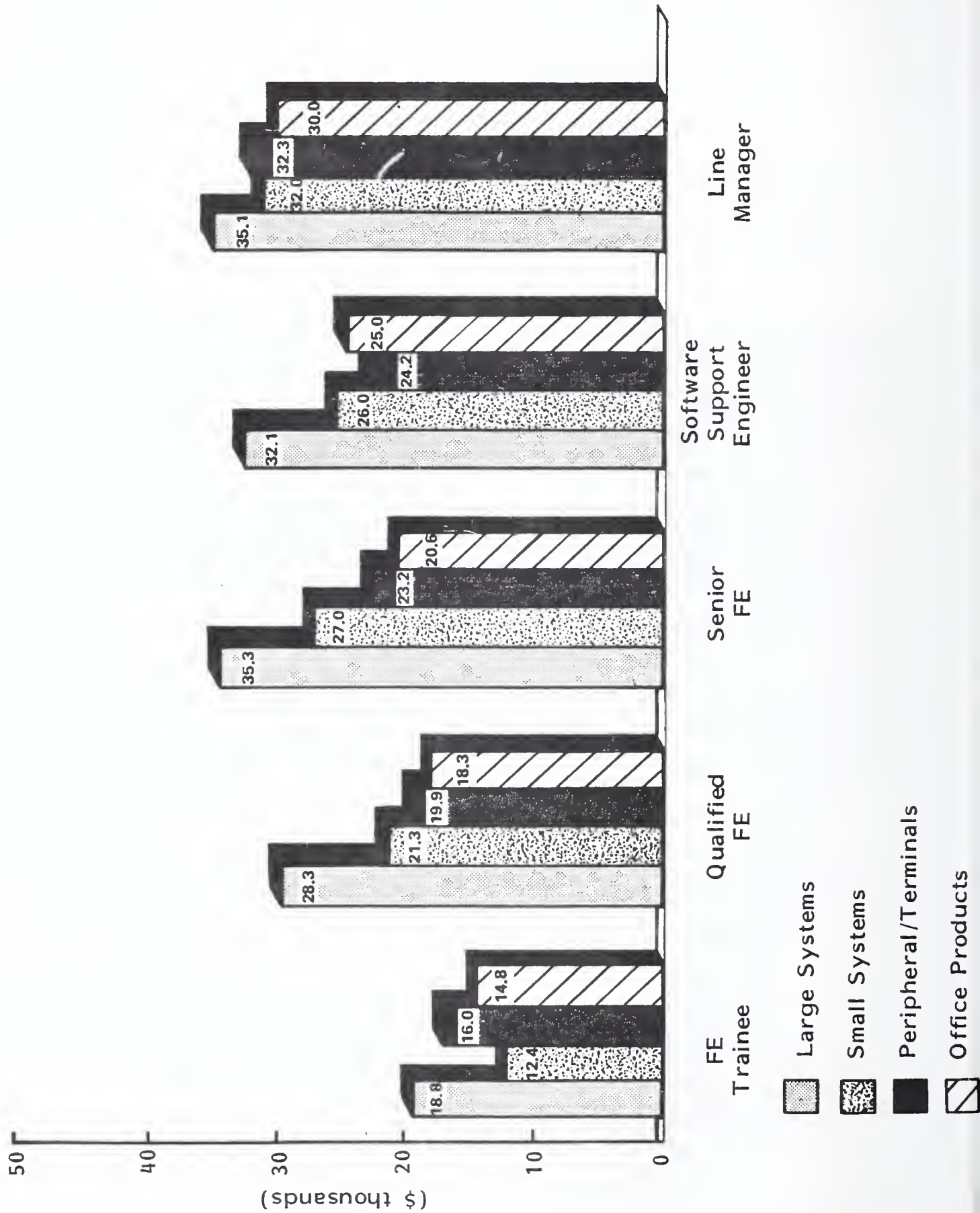
- In order to assure that the field service organization can effectively maintain the equipment the vendor is responsible for servicing, the field service organization has to balance two profiles, the service requirements profile, and the personnel requirements profile.
- The service requirements profile consists of the vendor's product mix, both current and planned, and the skill mix necessary to maintain the equipment produced. Both these factors are influenced by, for example, time and volume, the number of each type of product in the field, and the rate of increase of the base to be serviced in relation to the time needed to train the necessary staff. Once the field service managers have determined the above mixes, they can plan hiring and training programs that fit the personnel requirements profile.
- The personnel requirements profile is unique to each company and is made of up of a composite list of characteristics, both tangible and intangible, that help define the characteristics needed in a successful field engineer. These characteristics include basic education, service skills, compensation requirements, career goals, and personality. The last item (personality) is the most difficult to assess and/or modify through training, but it is a key component in the makeup of tomorrow's field engineers, since they will be called upon to fulfill a function that involves an increasing amount of client relations.

C. COMPENSATION

- Compensation includes salary, benefits, and incentives, and is an important element of the personnel requirements profile. Exhibit II-1 provides 1983 industry-wide salary averages for five field service positions: Field Engineer Trainee, Qualified Field Engineer, Senior Field Engineer, Software Support Engineer, and Line Manager.
- The highest average salaries in Exhibit II-1 typically went to large-system field service employees. In addition, large-system employees were the ones that received the largest salary increases in 1983 (averaging 9.8%). Even though field service employees in general received sizeable salary increases in 1983, there was a noticeable trend toward the lowering of entry-level salaries for each job classification. This lowering reflects the trend toward reduced skill requirements, particularly in technical positions, that is in turn being caused by increased reliance on remote diagnostics, board-swap repairs, and other advancements in machine maintenance.
- Benefits such as hospitalization and vacation sick leave are an important part of the overall compensation plan and can amount to over one-third of an employee's base salary. Both small- and large-system vendors reported that financial benefits were the benefits that had the most positive impact on employee satisfaction levels. Improvement programs (e.g., tuition reimbursement and career counseling) were also considered by vendors to be important performance motivators.
- Incentives constitute the third major component of field service compensation packages. In general, large-system vendors offer more incentives than small-systems vendors, but for both types of vendors the incentive is likely to be matched to the needs of the employee:

EXHIBIT II-1

AVERAGE FIELD SERVICE SALARY BY PRODUCT TYPE



- Management-level employees are typically offered performance incentives (e.g., performance bonuses or special projects).
 - Field engineers are offered stock options and recognition awards as incentives.
 - Support staff appear to be most highly motivated by periodic recognition awards and special projects.
- Developing and offering benefit/incentive plans will be particularly effective for small-system vendors that cannot afford to compete in salary with large-system vendors. Financial and recognition benefits have a more immediate and positive effect on productivity and staff morale.

D. CHANGES IN STAFFING LEVELS

- Both large- and small-system vendors expect staffing levels to increase in the next three to five years. Small-system vendors, however, will expand their staffs at a faster rate than will large-system vendors (due to the faster growth in sales of small computer systems).
- Growth in staffing levels will be most noticeable in the qualified field engineer category; however, other categories, such as software engineer, will also increase substantially. Large-system vendors reported that their most likely source of new employees will be referrals from present employees. Small-system vendors will be more dependent on competition and on external training programs.
- Most vendors interviewed by INPUT do not expect turnover to become a serious problem. Nevertheless, it could, as a result of several factors:

- The trend toward component exchange/repair will provide FEs with transferable skills.
- There will be increased demand for FEs and thus higher compensation/promotion offers from competition.
- The changing nature of field engineering will weaken the strong company ties that were common in the past.

E. THE CHANGING ROLE OF FIELD SERVICE

- In the past the internal (company) image of field service was that of a necessary expense - an activity that was a requirement of doing business in the computer equipment marketplace. (It is interesting to note that this is the attitude of many software product vendors today; these vendors do not view software maintenance as a profit center). At that time the external (user) view of the field engineer was equally narrow - the FE was viewed as a hardware problem fixer.
- Over the last five years the internal image of field service has changed dramatically to that of a major contributor to company revenue, profits, and growth. Simultaneously, with the inclusion of software maintenance in the responsibilities of the field service organization, the user has come to view the FE as the sole source of system support.
- The logical extension of this progression in the field service organization, both internally and externally, is the placement of total responsibility for post-sales support in the hands of field service. From the user standpoint this will mean a single source of support. (Support is currently divided into marketing support, e.g., training and documentation, sales support, and systems support.) From the vendor standpoint the logical extension is making the field

service organization responsible for managing each installed account - developing the account as well as servicing it, as shown in Exhibit II-2.

- This will bring the user view of field service closer to the company view and will require total unbundling of the various services provided:
 - Environmental planning.
 - Training (ongoing).
 - Documentation.
 - Systems consulting.
 - Software maintenance.
 - Hardware maintenance.
- Wherever field service manpower is used it should be tariffed and invoiced - including in-house time spent assisting sales in various capabilities (e.g., hardware/software configuration; installation planning). This accounting is necessary in order to bring to light the value of the hidden contributions that field service is currently making, contributions for which no revenue is accrued. Stricter accounting may also mean that some of the "free" services provided to customers (particularly consulting) will need to become chargeable items.
- The impact that the evolution in field service responsibilities has on the hardware engineer is shown in Exhibit II-3. In the past the field engineer was dispatched to a failed site before the engineer had any indication of the nature of the failure. Diagnosis was done with whatever equipment was available on-site; diagnosis began at the systems level and worked down. The increased use of remote diagnostics now permits diagnostic analysis prior to

EXHIBIT II-2

CHANGING ROLE OF FIELD SERVICE

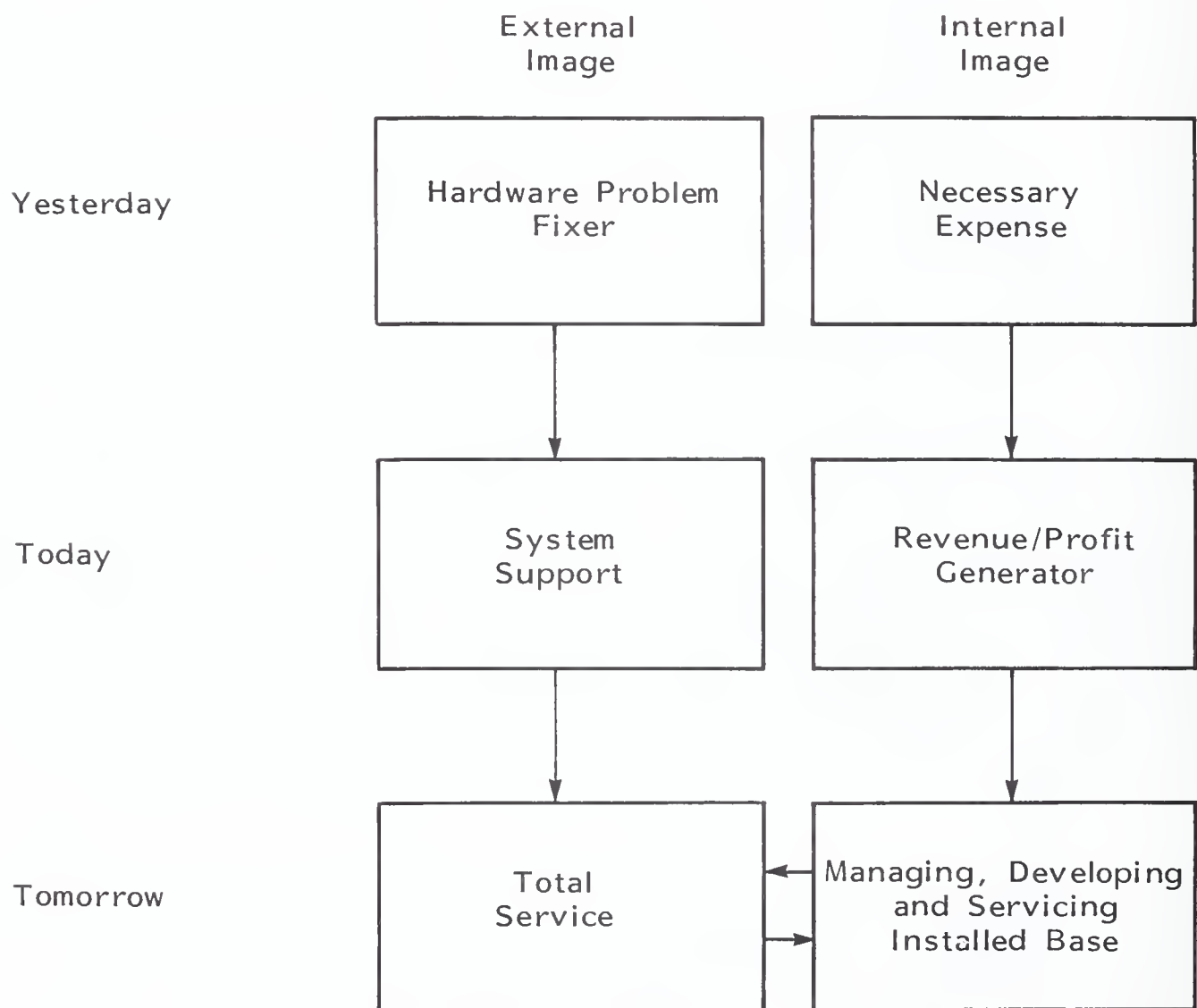


EXHIBIT II-3

CHANGING ROLE OF HARDWARE ENGINEER

	PAST	PRESENT	FUTURE
Diagnostic	<ul style="list-style-type: none"> • On Arrival with Available Means • At System Level 	<ul style="list-style-type: none"> • Prior to Arrival • At Subsystem Level 	<ul style="list-style-type: none"> • Self Diagnosing • At Component Level
Repair	<ul style="list-style-type: none"> • On-site Repair of Failed Component 	<ul style="list-style-type: none"> • Swap Failed Board, No Repair 	<ul style="list-style-type: none"> • Redundant or Fail-soft Hardware • Swap Failed Subsystem
System Status	<ul style="list-style-type: none"> • Down 	<ul style="list-style-type: none"> • Down 	<ul style="list-style-type: none"> • Up

dispatch so that on-site intervention concentrates on the failed subsystem that has been already identified. Future products are expected to be self-diagnosing to an even greater degree, so that diagnosis will be at the component level.

- Today's hardware engineer does less and less actual repair on-site. Failed boards are swapped, and the repair is left to the specialized repair centers. In the future, redundant or fail-soft hardware will enable the failed system to continue to function in at least a degraded mode so that the customer's continued use of the system will be minimally interfered with.
- In a similar fashion the software engineer's intervention has been modified dramatically, as shown in Exhibit II-4. In the past, on-site visits were necessary for software failures of all kinds. Many of these so-called failures were the result of user misunderstanding or misuse of the product. This kind of failure can be largely eliminated with the advent of the support center. In the future, the same remote connection that serves remote diagnostics from a hardware standpoint will also help the software support team with their diagnoses.
- Repair of a failure can then be effected by the down-line loading of either the patched or the revised code to the library version of the failed software package. This revised version can then be booted, the system restarted from the last checkpoint, and the customer's use of the system continued.
- In this manner, similar to the hardware failure resolution, tomorrow's user will get greatly improved response time on software failures; the vendor's costs for that same activity will be significantly reduced. This arrangement will also allow for a more stable schedule of revision issue because the pressure from the user base will be greatly diminished.

EXHIBIT II-4

CHANGING ROLE OF SOFTWARE ENGINEER

	PAST	PRESENT	FUTURE
Diagnostic	● On-site	● Support Center Assistance	● Remote Tie in
Repair	● On-site	● Revised Version Shipped	● Down-line Loading of Patched or Revised Code
System Status	● Down	● Down	● Degraded But Still Operable

F. TRAINING, THE KEY TO SERVICE

- With all of these new roles to fulfill, the field service management of each company is faced with a series of important decisions:
 - What is the schedule of responsibilities that the field service organization is expected to accomplish over the next five years?
 - How does the current skill mix of that organization match the assigned responsibilities?
 - What is the schedule of training that is necessary to accomplish the revision of skills required by the plan?
- The proper training schedule will be essential to the development of an effective field service labor force. As the demand for field service staff continues to rise, large- and small-system vendors will be forced to develop or expand training programs.
- Traditional in-house training will continue to be important, particularly at the base product/technical level. Over 90% of all small- and large-system vendors offer this training now and plan to continue it in the future. In-house training on software support and management development have been targeted by many vendors as important growth areas for the future.
- External training has increased among small-system vendors for several reasons:
 - The high cost of developing internal training programs.
 - The availability of qualified instructors at external training institutions.

- The demand for training on competitive equipment.
- Even though the number of external training programs has risen dramatically, it is unlikely that the supply of trained field service staff will keep up with the demand. The probable result of this excess demand will be an increase in the number of internal training programs.
- Organizationally, a number of changes will have to be made that put in place a reporting structure that is compatible with the new responsibilities. In addition, some of the changes may require modification of commission plans (to compensate for the reassignment of some of the sales responsibilities) and the modification of revenues and profit center plans.
- It is unlikely that all of the changes discussed in this report will be able to be implemented in one step. Certainly much discussion will be needed between marketing and field services to resolve the points of contention that will arise. INPUT nevertheless believes that the time to plan such changes is now, because the training cycle is long for even the simplest of additional skills.

III CHANGING ROLE OF THE FIELD SERVICE ENGINEER

III CHANGING ROLE OF THE FIELD SERVICE ENGINEER

A. INTRODUCTION

- Both large- and small-system field service vendors are attempting to maximize service productivity by "thinking above the numbers" and developing a long-range field service profile.
- This increased interest in productivity results from the fact that a substantial majority of system vendors now view their field service operations as profit/loss centers rather than cost centers. Between 1978 and 1982 the percentage of vendors operating field service as a profit/loss center rose from 63% to 88%.
- If profits are to increase, the field engineer's role must change significantly in the next five years. Individual field service vendors are now developing profiles of their field service work force so that the number of people, their skills, and their personal characteristics can be more closely matched with the company's anticipated product mix.
- In general, vendors are matching Service Requirement Profiles (SRP) to Personnel Requirement Profiles (PRP) in order to eliminate unnecessary personnel expenses and at the same time maintain customer satisfaction.

B. CHANGES IN SERVICE REQUIREMENT PROFILES

- One of the most influential factors affecting field service in the 1980s will be the design of both hardware and software systems requiring significantly reduced service and/or maintenance.
- The reduced service requirements will be offset by a larger user population. Consequently, the overall number of field service personnel is expected to continue increasing at 2-4% annually throughout the decade. However, the skills requirements for FEs will be altered by changes in the product mix.
- Vendors reported that the following product changes will have a substantial impact on field service:
 - Modularization - although virtually all vendors acknowledged the trend toward modularization, some questioned the effect this would have on the capital requirement for parts inventories. The economy of scale in repairs and an improved mean repair time were cited as the two major advantages of modularization.
 - Remote diagnostics - 79% of the large- and small-system vendors interviewed by INPUT said they now have or will have by 1985 remote diagnostic capabilities for their equipment.
 - User self-diagnostics - users are somewhat reluctant to become involved in diagnosing their equipment. Vendors feel, however, that cost savings will improve the attractiveness of this option.
 - Redundant hardware. The use of redundant hardware and subsystems is seen as a way to promote "fail-safe" systems that could be serviced on a routine, rather than emergency, basis; the system is functional although partially failed.

- Exhibits II-2, II-3, and II-4 demonstrate how the service engineer's role has changed as a result of changes in the product mix. In general, the trend for both hardware and software services is away from detailed technical knowledge and toward interpersonal, administrative, and management skills.
- Self-diagnosing systems and board/subsystem replacement (rather than on-site repair) will facilitate the move to the new type of field engineer. On the software side, remote diagnostics/communications will permit a remote centralized service facility to supplement or even replace on-site service. It might even be possible for the self-diagnosing system to automatically notify field service operations of a fault occurrence and its nature.
- Vendors surveyed by INPUT have recognized this trend and are developing service personnel profiles that, among other things, require less overall system knowledge and more interpersonal skills, particularly in customer interaction. In addition the service organization must be involved in helping provide another level of customer satisfaction: configuration expansion and growth.
- As field engineers become more involved in this process, communication between field service personnel and the users will have to improve significantly.
- Exhibits III-1 and III-2 indicate that while large- and small-system users most prefer traditional on-site maintenance, a substantial number (particularly in software maintenance) are interested in alternative maintenance delivery methods. These alternative methods will require a much higher level of communication skills from the FE than was previously necessary when the FE was responsible only for service.

EXHIBIT III-1

LARGE-SYSTEM USER ATTITUDES TOWARD ALTERNATIVE DELIVERY METHODS FOR MAINTENANCE

MAINTENANCE DELIVERY METHOD	RATING (1 - 10) *	
	HARDWARE	SOFTWARE
Traditional On-site Response to Trouble Calls	8.6	7.4
User Involvement in Diagnosis – Working With Support Centers	6.0	6.4
User Involvement in Diagnosis – Working With Remote Diagnostics	6.5	7.0
User Involvement Replacing Circuit Boards, Other Components, or Patching Software	4.2	5.5
User Delivery of Portable Modules to Repair Centers	4.2	3.9

* Rating: 1 = Low, 10 = High

EXHIBIT III-2

SMALL-SYSTEM USER ATTITUDES TOWARD ALTERNATIVE DELIVERY METHODS FOR MAINTENANCE

MAINTENANCE DELIVERY METHOD	RATING (1 - 10) *	
	HARDWARE	SOFTWARE
Traditional On-site Response to Trouble Calls	8.4	8.1
User Involvement in Diagnosis – Working With Support Centers	5.6	5.6
User Involvement in Diagnosis – Working With Remote Diagnostics	6.4	6.7
User Involvement Replacing Circuit Boards, Other Components, or Patching Software	5.1	5.4
User Delivery of Portable Modules to Repair Centers	4.0	4.0

* Rating: 1 = Low, 10 = High

C. CHANGES IN THE PERSONNEL REQUIREMENTS PROFILE

- Improving field engineers' communication skills is seen by both users and vendors as an important part of the Personal Requirements Profile (PRP). In many cases, the FE is the vendor's sole representative at the user's site and poor communication on the FE's part can lead to an unfavorable rating of the vendor as a whole.
- Exhibit III-3 lists user ratings of field services communication. It is significant that software engineers achieved a substantially lower rating than hardware engineers in communication skills. In part, this is caused by the lack of personal interaction between the user and the software engineer.
- In the future, career advancement will be less dependent on technical expertise and more dependent on the FE's ability to interrelate with people. As mentioned above, "people skills" will be essential when dealing with users who are diagnosing or servicing their own equipment. Interpersonal skills will also be necessary to interact with a field service workforce that is substantially larger.
- As compatibility in FE skills requirements and overall industry demand increase, turnover rates for field engineers will increase. This situation is in direct contrast to that of the past, when specialization in one particular product actually limited turnover.
- Because of the need for field engineers with improved communication and interrelational skills, vendors anticipate that the future FE workforce will be more extroverted and outgoing - particularly when related to sales support (discussed below).
- A second personnel requirement that will change as a result of a new product mix is training. In the past, an FE was required to have knowledge of an

EXHIBIT III- 3

USER RATINGS OF VENDOR COMMUNICATIONS

VENDOR STAFF CATEGORY	LARGE SYSTEM	SMALL SYSTEM
Management	7.4	7.3
Hardware Engineer	8.0	8.0
Software Engineer	6.8	6.2

Rating: 1 = Low, 10 = High

entire system. This technical expertise took years to develop and was difficult to transfer to other products. In the future, training (discussed below in Chapter V) will take advantage of advanced diagnostic equipment and advanced component exchange procedures. Training will emphasize specialization at the subcomponent level.

- Integration of software support into the hardware support function is the third major change in the personnel requirements profile. Exhibits III-4 and III-5 demonstrate that both large- and small-system vendors are integrating system and application software support into hardware-oriented field service and maintenance.
- Vendors report that this integration is necessary for two reasons. First, field service departments, in order to implement the "total service concept," must have the in-house expertise to solve all problems at the user's site. Second, users are requiring integration of service that corresponds to the increasing integration of hardware and software sales.

D. SALES AND AFTER-SALES SUPPORT

- User resistance to the FE in a direct-sales role is likely to preclude any activity by the FE in this area. However, users clearly value and trust the opinion of "their" field engineer. They feel that FE opinions are objective, and knowledgeable.
- Vendors have realized that if the FE is to be effective in this area, it must be through indirect support of selected sales opportunities. Otherwise the vendor risks alienating the user in both sales and service.
- Exhibit III-6 indicates that a majority of large- and small-system vendors are encouraging their field service personnel to be involved in some aspect of the

EXHIBIT III- 4

LARGE-SYSTEM INTEGRATION OF
SOFTWARE SUPPORT INTO HARDWARE SUPPORT FUNCTION

INTEGRATION OF LARGE – SYSTEM SOFTWARE SUPPORT ACTIVITY	PERCENT OF VENDORS IMPLEMENTING	DEGREE OF INTEGRATION (percent)	
		1983	1985
Systems Software	71%	76%	88%
Applications Software	43	100	100
Third-Party Software	14	100	100

EXHIBIT III-5

SMALL-SYSTEM INTEGRATION OF SOFTWARE SUPPORT INTO HARDWARE SUPPORT FUNCTION

INTEGRATION OF LARGE – SYSTEM SOFTWARE SUPPORT ACTIVITY	PERCENT OF VENDORS IMPLEMENTING	DEGREE OF INTEGRATION (percent)	
		1983	1985
Systems Software	60%	46%	68%
Applications Software	53	27	47
Third-Party Software	0	0	0

EXHIBIT III-6

SELECTED FIELD SERVICE EMPLOYEE ACTIVITIES ENCOURAGED BY VENDORS – LARGE AND SMALL SYSTEMS

ACTIVITIES	1983 (percent)
Making Goodwill Calls	95%
Furthering Formal Education	65
Accompany Sales Personnel on Calls	60
Making Public Appearances	75
Selling Maintenance Contracts	65

sales function. This trend has been and will continue to become more pronounced as vendors shift field service operations from cost center to profit center status.

- Exhibit III-7 and III-8 list user attitudes toward the FE in a sales role. A substantial number of users of both large- and small-systems favor the FE selling hardware features, upgrades, and add-on equipment. In general, the users felt that the FE was the person most experienced and knowledgeable in these areas.
- Users were opposed to FEs selling supplies, new models of equipment, and software packages. They felt that the FEs' service role would be compromised if they were to sell in these areas. In addition, users questioned whether or not the FE could perform in such diverse roles as direct sales and service.
- Building on improved interpersonal and communication skills, future FEs will provide after-sales and indirect-sales support, particularly maintenance, to users. Field engineers will not operate in a direct-sales role so as not to alienate users and dissipate built-up goodwill.

EXHIBIT III-7

LARGE-SYSTEM USER ATTITUDES TOWARD FIELD ENGINEERS IN SALES ROLES (percent)

SALES ACTIVITY	FAVOR	NEUTRAL	OPPOSE
Supplies	24%	14%	62%
Hardware Features	50	8	42
Add-ons	47	10	43
Upgrades	52	8	40
New Models	37	9	54
Software Features	23	12	65

EXHIBIT III- 8

SMALL-SYSTEM USER ATTITUDES TOWARD FIELD ENGINEERS IN SALES ROLES (percent)

SALES ACTIVITY	FAVOR	NEUTRAL	OPPOSE
Supplies	35%	12%	53%
Hardware Features	61	7	32
Add-ons	57	7	36
Upgrades	60	8	32
New Models	47	8	45
Software Features	30	10	60

IV COMPENSATION PROGRAMS

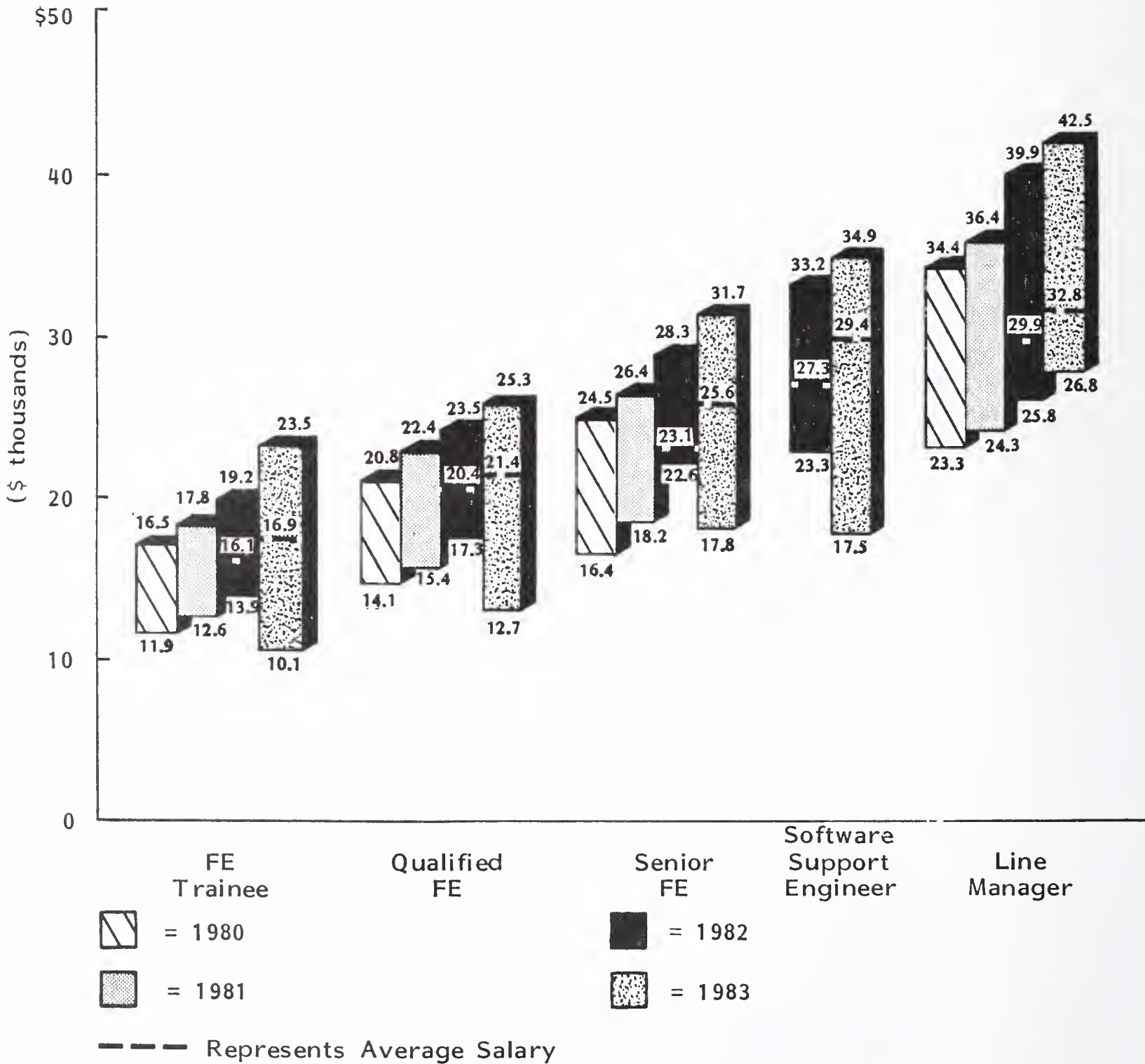
IV COMPENSATION PROGRAMS

A. FIELD SERVICE PERSONNEL SALARY LEVELS

- Exhibit IV-1 demonstrates the 1980-1983 increases in field service salary levels by job title. Vendors reported an increase in salary for all job categories. As might be expected during a recession, some increases were considerably lower in 1982-1983 than they were in 1981-1982. Qualified field engineers, for example, received an average 4.9% increase in salary in 1983 compared to an 8.9% increase in 1982.
- Senior field engineers and line managers enjoyed the largest average increase in salary in 1983 (10.8% and 9.7%, respectively). Trainees and qualified field engineers had the lowest increase (5.0% and 4.9% respectively). The average salary increase for all field service personnel was over 8%, considerably above the average of 4.8% for all nonfarm workers in the U.S.
- Exhibit IV-1 also illustrates the broad range of salaries paid to field service employees in 1983. Vendors reported that the low end of salary ranges, particularly for trainees, qualified FEs, and software engineers, dropped considerably in 1983. This is due to the fact that as the skill level of these positions was reduced, so were the entry-level salaries.
- As mentioned in Chapter III, remote diagnostics, component exchange-not-repair, and user self-diagnostics are some of the factors that are contributing

EXHIBIT IV-1

TRENDS IN FIELD SERVICE COMPENSATION - ALL PRODUCT TYPES



to the trend toward reduced technical skills requirements. Vendors are anticipating lower average salaries, particularly at the primary technical level, as a result of lower skill level requirements.

- The burden of increased technical support will fall to senior field engineers and, in some cases, line managers. Vendors recognize the essential role these staff levels provide and are rewarding them accordingly.
- The role, and consequently the salary, of the software engineer will vary according to the product type. Small-system vendors, for example, are increasing their software engineer salaries faster than they are the salaries for any other job category. (Salary increases are apparently tied to the escalating requirements for small-system software.) Large-system vendors, however, are increasing software engineers' salaries slower than they are any other category because the demand for mainframe software has been reduced.

B. LARGE- AND SMALL-SYSTEM FIELD SERVICE SALARIES

- Exhibit IV-2 and IV-3 list the average salary levels in 1983. They also show the percent increases over 1982 for large-system and small-system field service personnel.
- For a given job category, large-system vendors, as shown in Exhibit IV-2, paid an average of 20% higher salaries than did small-system vendors, as shown in Exhibit IV-3. Salaries for senior field engineers showed the largest variance - large-system vendors paid an average of 31% more than did small system vendors.
- The generally higher salaries reported by large-system vendors are the result of several factors:

EXHIBIT IV-2

SALARY BY JOB TITLE:
LARGE-SYSTEM VENDORS

TITLE	AVERAGE 1983 SALARY	GAIN OVER 1982 (percent)
Trainee	\$18,800	10.0%
Qualified Field Engineer	28,800	10.0
Senior Field Engineer	35,300	10.0
Software Support Engineer	32,100	8.0
Line Manager	35,100	10.0

EXHIBIT IV-3

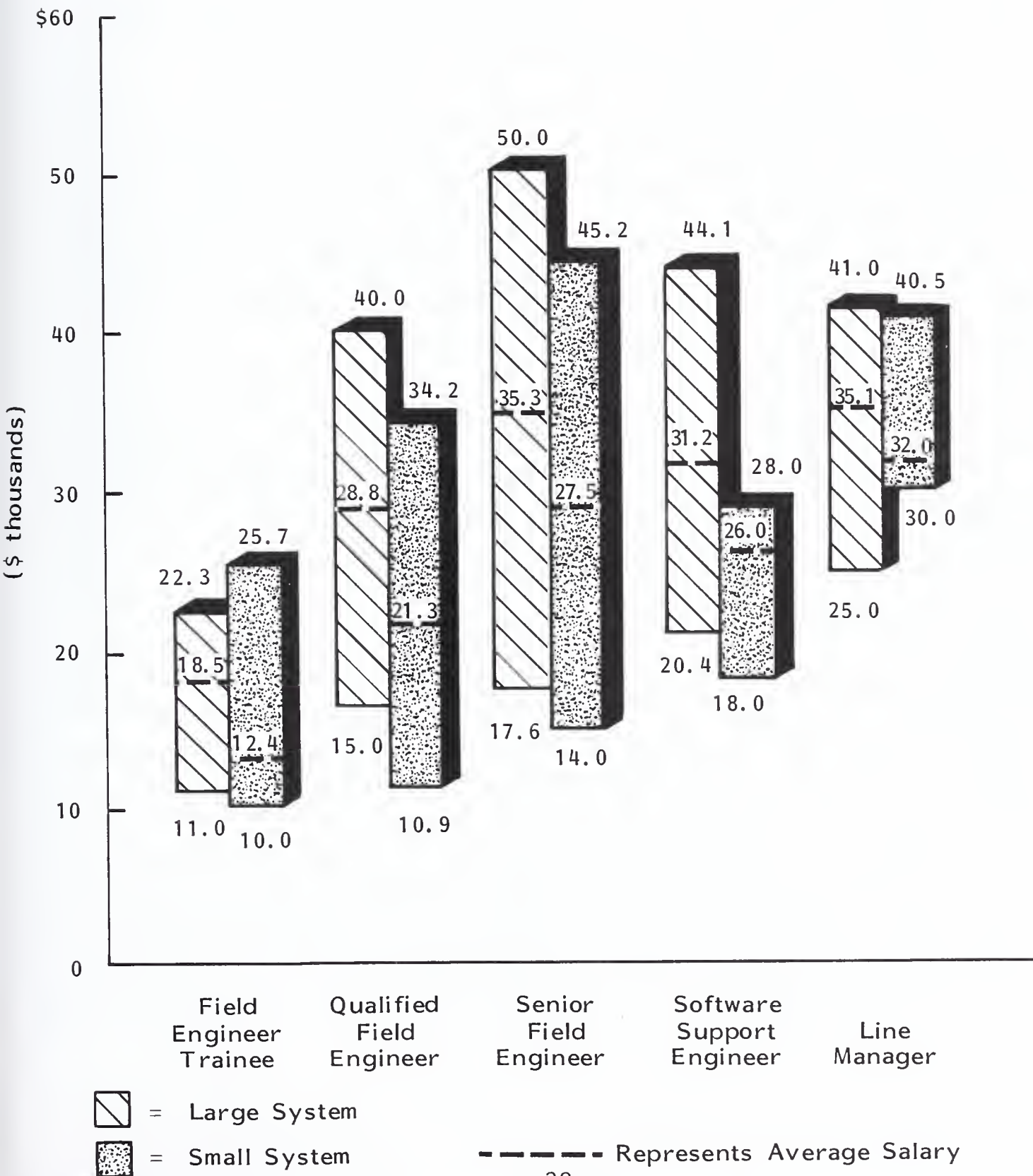
SALARY BY JOB TITLE:
SMALL-SYSTEM VENDORS

TITLE	AVERAGE 1983 SALARY	GAIN OVER 1982 (percent)
Trainee	\$12,400	8.0%
Qualified Field Engineer	21,300	8.0
Senior Field Engineer	27,000	8.0
Software Support Engineer	26,000	10.0
Line Manager	32,000	6.0

- A more experienced work force with high skill levels.
 - A generally older workforce benefiting from high (based on seniority) compensation levels.
- The weighted average salary increase for large-system field service employees was 9.8% - considerably above the average of 8% received by small-system field service staff. Large-system vendors reported that 10% salary increases were uniform throughout the job classifications, except for software support engineers, who received 8% salary increases.
 - Software support engineers for small-system vendors received above-average salary increases. These vendors are planning rapid increases in the integration of hardware and software field service support (shown in Exhibits III-7 and III-8). This integration is the basis of increased demand for small-system software support.
 - Line managers received the lowest percent salary increase (6%) of all small-system field service job categories. This reflects a relative surplus of available managers at this time. INPUT projects that as overall staff levels and managerial demands increase, line managers' salaries will increase at a more substantial rate.
 - Exhibit IV-4 compares salary ranges for large- and small-system vendors. Represented graphically are the higher average salary paid by large-system vendors and the generally lower range of salaries paid by small-system vendors.

EXHIBIT IV-4

LARGE- AND SMALL-SYSTEM VENDORS - SALARY RANGES BY JOB TITLE



C. BENEFITS

- Benefit packages are becoming an increasingly important - and expensive - part of the total employee compensation plan. These packages include vacations, insurance, sick leave, etc., and account for over one-third of an employee's total compensation. This figure will continue to rise as small- and large-system vendors seek out new benefits in order to attract qualified field service staff.
- The impact of benefits on the satisfaction level of field service employees is shown in Exhibit IV-5 (large systems) and Exhibit IV-6 (small systems). Most large- and small-system vendors reported that "standard" benefits, such as hospitalization, medical coverage, and sick leave, are now expected by employees and are therefore not significant factors in the employees' satisfaction level (unless benefits are withdrawn or decreased).
- However, vendors report that benefits in the form of financial contributions or reimbursements have a significant positive impact on the employee satisfaction level. Some of the benefits that vendors cite as having the most potential for positive impact include:
 - Matched savings.
 - Profit sharing.
 - Automobile expense reimbursement.
- An additional advantage of using financial contributions as benefits is that they often result in reduced labor turnover. This type of benefit often requires long-term "vesting" periods - an employee will enjoy the full benefit only by staying with the company for the full period.

EXHIBIT IV-5

IMPACT OF FRINGE BENEFITS ON SATISFACTION LEVEL OF EMPLOYEES – LARGE-SYSTEM VENDORS

BENEFIT	PERCENT WHO FEEL THAT BENEFIT WAS A SIGNIFICANT IMPACT	
	1983	By 1985
Life Insurance	67%	67%
Hospitalization	100	100
Major Medical	100	100
Limited Medical	67	67
Dental	67	100
Eyesight /Glasses	100	33
Retirement	33	67
Disability Insurance	67	67
Matched Savings	33	33
Profit Sharing	67	67
Paid Sick Leave	100	100
Grievance Procedures	100	100
Improvement Programs	100	100
Exit Interviews	100	100
Appraisal and Counseling	100	100
Career Path Definitions	67	67
Pay for Meeting Performance Guidelines	67	67

EXHIBIT IV-6

IMPACT OF FRINGE BENEFITS ON SATISFACTION LEVEL OF EMPLOYEES - SMALL-SYSTEM VENDORS

BENEFIT	PERCENT WHO FEEL THAT THE BENEFIT HAD A SIGNIFICANT IMPACT	
	1983	By 1985
Life Insurance	86%	86%
Hospitalization	100	100
Major Medical	100	100
Limited Medical	57	57
Dental	57	57
Eyesight/Glasses	29	29
Retirement	43	43
Disability Insurance	71	57
Matched Savings	29	43
Profit Sharing	43	43
Paid Sick Leave	57	57
Grievance Procedures	57	43
Improvement Programs	57	71
Exit Interviews	71	71
Appraisal and Counseling	71	71
Career Path Definitions	57	57
Pay for Meeting Performance Guidelines	43	43

- A second group of benefits that vendors report have a positive impact on employees are those that lead to career advancement. Some of these benefits include:
 - Tuition reimbursement (see below).
 - Career path definitions.
 - Counseling and appraisal.
- These benefits provide the employee with the opportunity to grow personally and professionally. In addition, benefits are seen by the vendors as an excellent method of developing a personnel requirements profile that meets the changing requirements for service.

D. INCENTIVES

- Incentives are used by field service vendors to reward or motivate individual employees in a more direct and immediate way than is possible with salary increases. In addition, incentives are often public in nature and are designed to encourage similar levels of performance among other employees.
- Exhibits IV-7, IV-8, and IV-9 list the incentives offered to three types of field service employees - management, as shown in Exhibit IV-7, exempt, as shown in Exhibit IV-8, and nonexempt, as shown in Exhibit IV-9.
- Stock options, performance bonuses, and special projects were the top three incentives offered to management-level field service employees, as shown in Exhibit IV-7. Over 50% of the large- and small-system vendors combined offered these incentives. As might be expected, suggestion awards ranked low on the list of incentives offered to managers.

EXHIBIT IV-7

INCENTIVES OFFERED TO FIELD SERVICE MANAGEMENT EMPLOYEES: LARGE- AND SMALL-SYSTEM VENDORS COMBINED

INCENTIVE	PERCENT OF COMPANIES IN 1983	PERCENT OF COMPANIES BY 1985
Stock Options	100%	38.5%
Performance Bonuses	75	46.1
Suggestion Awards	0	23.0
Periodic Recognition Awards	75	38.5
Special Projects, Foreign Assignments, etc.	100	38.5
Award Conferences, Trips	75	30.8

EXHIBIT IV-8

INCENTIVES OFFERED TO FIELD SERVICE EXEMPT EMPLOYEES:
LARGE- AND SMALL-SYSTEM VENDORS COMBINED

INCENTIVE	PERCENT OF COMPANIES IN 1983	PERCENT OF COMPANIES BY 1985
Stock Options	50%	38.5%
Performance Bonuses	75	23.0
Suggestion Awards	50	23.0
Periodic Recognition Awards	75	46.1
Special Projects, Foreign Assignments, etc.	100	30.8
Award Conferences, Trips	75	30.8

EXHIBIT IV-9

INCENTIVES OFFERED TO FIELD SERVICE NONEXEMPT EMPLOYEES: LARGE- AND SMALL-SYSTEM VENDORS COMBINED

INCENTIVE	PERCENT OF COMPANIES IN 1983	PERCENT OF COMPANIES BY 1985
Stock Options	25%	38.5%
Performance Bonuses	50	31.0
Suggestion Awards	50	23.0
Periodic Recognition Awards	75	46.1
Special Projects, Foreign Assignments, etc.	100	30.8
Award Conferences, Trips	75	30.8

- Incentives offered to exempt employees (including qualified and senior field engineers, as well as software support engineers) are shown in Exhibit IV-8. Periodic recognition awards, used by 75% of large-system and 23% of small-system vendors, are the most common incentives offered to exempt employees. Somewhat less popular are special projects (used by 100% of large-system and 31% of small-system vendors) and stock options (50% and 38.5%, respectively).
- Nonexempt employees, listed in Exhibit IV-9, are typically staff and support personnel. Periodic recognition awards such as "Employee of the Month" are the most commonly used incentives for nonexempt employees. Special projects, the second most commonly used incentive, are offered by 100% of the large-system vendors and 30.8% of the small-system vendors.

E. REIMBURSEMENT PRACTICES

- Both large- and small-system vendors indicated that reimbursement for selected activities was becoming increasingly important to the employees. Vendors said that reimbursement was a cost-effective benefit in that many of the expenses were actually shared by the employee.
- Exhibits IV-10 through IV-12 list the reimbursement practices of large- and small-system vendors. A large majority of vendors provide at least partial reimbursement for the four categories listed in Exhibit IV-10 and many vendors regard reimbursement as an integral part of their staff development policy.
- Partial or full tuition reimbursement was provided by all large- and small-system vendors. Eighty-seven percent of small system vendors offer full reimbursement for tuition expenses, as opposed to 67% of large-system

EXHIBIT IV-10

REIMBURSEMENT PRACTICES – LARGE- AND SMALL-SYSTEM VENDORS COMBINED

CATEGORY	FULLY REIMBURSED (percent)	PARTIALLY REIMBURSED (percent)	NOT REIMBURSED (percent)
Tuition Reimbursed	71%	29%	0%
Relocation/Moving Expenses	76	14	10
Company Products	24	38	38
Professional Association Memberships/ Journals	71	19	10

EXHIBIT IV-11

REIMBURSEMENT PRACTICES – LARGE-SYSTEM VENDORS

CATEGORY	FULLY REIMBURSED (percent)	PARTIALLY REIMBURSED (percent)	NOT REIMBURSED (percent)
Tuition Reimbursed	67%	33%	0%
Relocation/Moving Expenses	100	0	0
Company Products	0	80	20
Professional Association Memberships/ Journals	80	20	0

EXHIBIT IV-12

REIMBURSEMENT PRACTICES – SMALL-SYSTEM VENDORS

CATEGORY	FULLY REIMBURSED (percent)	PARTIALLY REIMBURSED (percent)	NOT REIMBURSED (percent)
Tuition Reimbursed	87%	13%	0%
Relocation/Moving Expenses	69	19	12
Company Products	31	25	44
Professional Association Memberships/ Journals	69	19	12

vendors. This reflects the need of small-system vendors for external training sources.

- Relocation/moving expenses and professional association membership expenses are at least partially reimbursed by 90% of the large- and small-system vendors interviewed. Large-system vendors typically provide a higher percentage of reimbursements than small-system vendors in these areas.
- Thirty-eight percent of large- and small-system vendors did not reimburse their employees for the purchase of company products. Several vendors commented that although their companies did not currently offer this benefit, they will consider it in the future. They cited increased technical/product knowledge and improved company image as probable results of reimbursements in this area.
- Vendors acknowledged that some reimbursement practices, particularly in training and education, made their employees more marketable and tended to increase labor turnover. They reiterated, however, that this was still one of the most effective methods of developing their field service staff.

V TRAINING AND EDUCATION

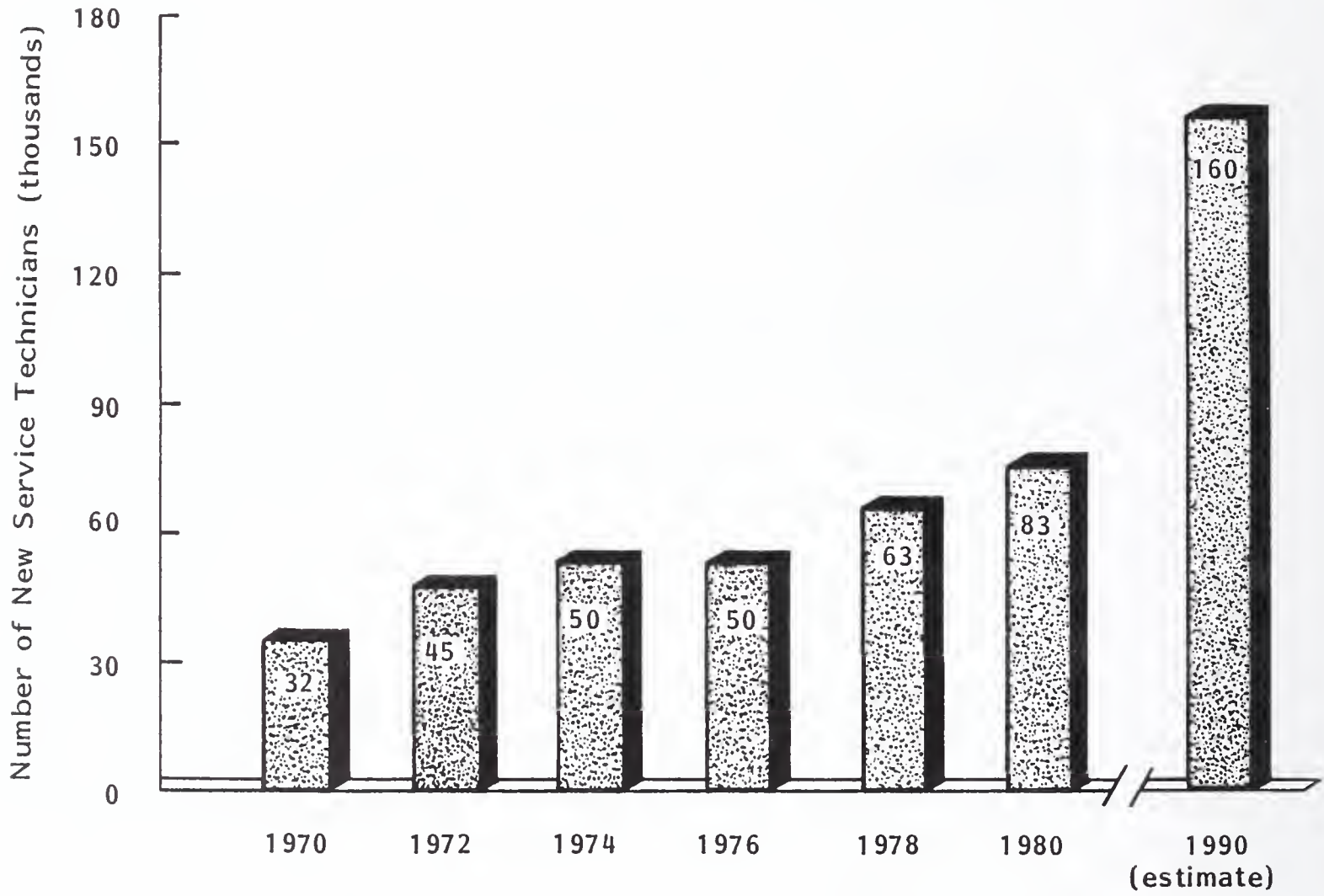
V TRAINING AND EDUCATION

A. INTRODUCTION

- Exhibit V-1 demonstrates the dramatic growth of computer field service personnel in the United States. This growth is the result of two factors:
 - Decreasing hardware costs and the resulting increase in the amount of computer equipment in use.
 - The greater geographic distribution of computers.
- By 1990, the Bureau of Labor Statistics estimates there will be a need for one million new professionals trained in computer skills. Field service personnel is expected to show the largest increase of all computer-related occupations - 93%.
- INPUT estimates that the average number of openings for field service technicians will be over 8,000 annually from 1980 to 1990.
- Even though the overall level of technical skills required of FEs will be decreasing (see Chapter III), in-house company training will not be sufficient to meet the demand for field service personnel.

EXHIBIT V-1

GROWTH IN EMPLOYMENT OF COMPUTER SERVICES TECHNICIANS



SOURCE: Bureau of Labor Statistics

B. IN-HOUSE TRAINING

- Historically, in-house training by companies was considered to be one of the best training methods. All the large- and small-system vendors interviewed by INPUT continue to maintain extensive training programs. A large number of respondents indicated that a substantial increase in training and education expenditures was expected over the next four to five years.
- Exhibit V-2 and V-3 list the formal training programs offered to employees by large- and small-system vendors. In general, large-system vendors offer more in-house training than do small-system vendors. This can be explained, in part, by the expense of training programs and by the recruitment policies of small-system vendors (discussed below).
- All large-system vendors interviewed provide basic technical training (including basic training, product training, and upgrades, as shown in Exhibit V-2) to their employees. As noted above, this training is considered standard procedure and is expected to continue in the future.
- Small-system vendors typically recruit personnel that already possess basic experience in field service. However, most small-system vendors do maintain training programs in product maintenance and upgrades.
- Both large- and small-system vendors are increasing their integration of hardware and software support functions (as demonstrated in Exhibits III-7 and III-8). Since large-system vendors are anticipating a more rapid integration than small-system vendors, it is logical that these vendors would offer a higher level of training in this area. Details are in Exhibit V-2.
- Sixty-three percent of small-system vendors are providing training in systems software support and 47% in applications support. While these figures are substantially lower than for large-system vendors (83% and 67%, respec-

EXHIBIT V-2

LEVEL AT WHICH COMPANY PROVIDES FORMAL TRAINING - LARGE-SYSTEM VENDORS

TRAINING AREA	PERCENT OF COMPANIES
Orientation	83%
Basic Training (Apprentice Level)	100
Product Training (Technical Level)	100
Systems Software	83
Applications Software	67
Management Development	100
Technological Upgrading	100

EXHIBIT V-3

LEVEL AT WHICH COMPANY PROVIDES FORMAL TRAINING - SMALL-SYSTEM VENDORS

TRAINING AREA	PERCENT OF COMPANIES
Orientation	40%
Basic Training (Apprentice Level)	56
Product Training (Technical Level)	94
Systems Software	63
Applications Software	47
Management Development	56
Technological Upgrading	81

tively), they do indicate a recognition by vendors of the importance of software support in field engineering.

- In-house training of management development was supported by 100% of the large-system vendors, but by only 56% of the small-system vendors. INPUT believes that the low percentage of small-system vendors offering this training reflects vendors' desire to recruit trained managers and/or utilize external training sources.
- Exhibit V-4 indicates that vendors are planning to increase service on competitive products. This will increase the level of in-house training for three reasons:
 - External training sources (trade schools, colleges, etc.) are not able to develop course curriculum fast enough or detailed enough to encompass new competitive products.
 - Trained instructors will not be available.
 - Vendors will have limited input as to which competitive products will be included in the curriculum.

C. EXTERNAL TRAINING

- As noted above in section B, most computer training in the 1950s and 1960s came from computer manufacturers. There were three basic problems with this method:
 - FEs acquired only limited skills.
 - FEs learned only one type of equipment.

EXHIBIT V-4

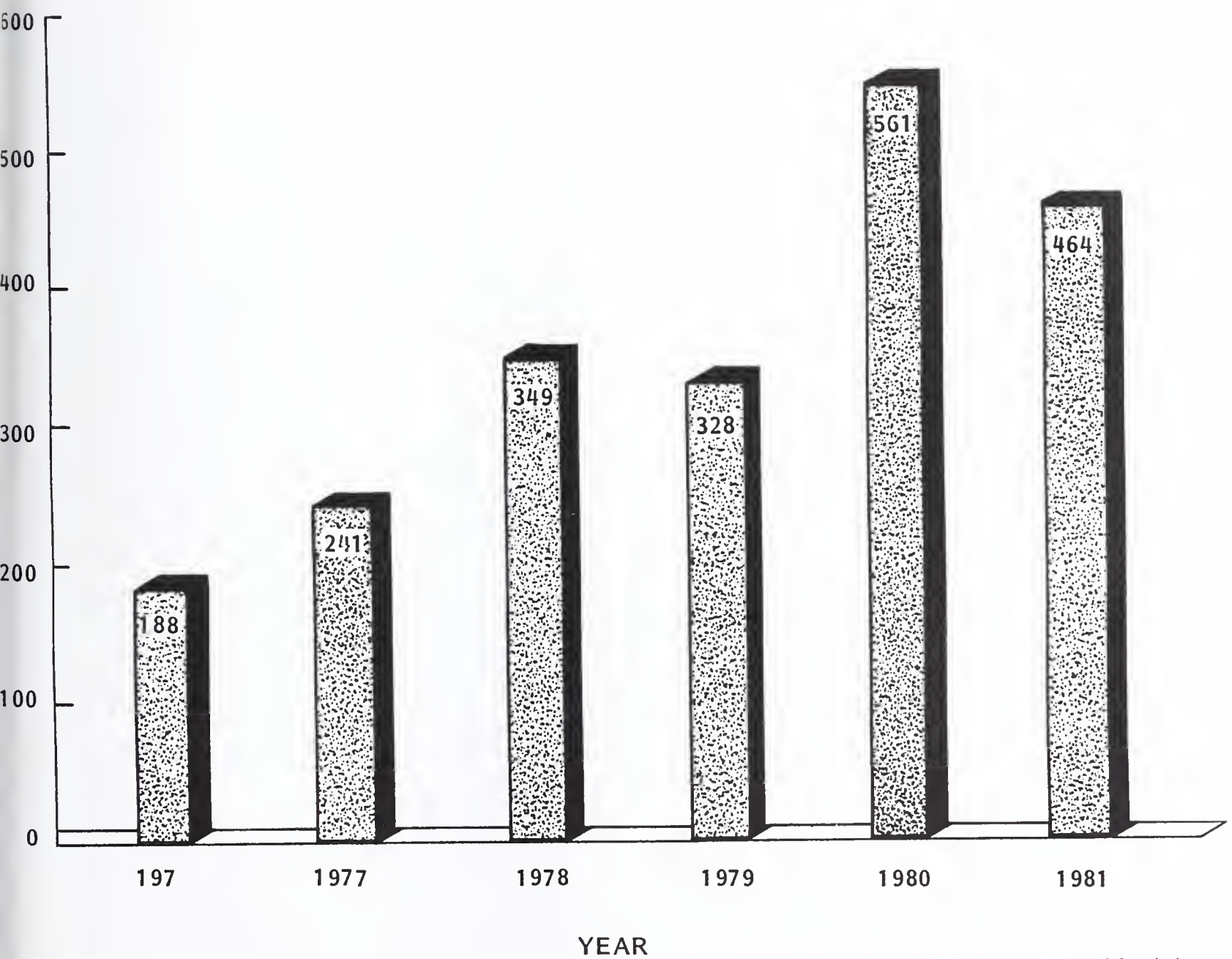
SMALL- AND LARGE-SYSTEM VENDORS OFFERING THIRD-PARTY MAINTENANCE

VENDOR	PERCENT VENDORS PROVIDING TPM IN:	
	1983	1985 (projected)
Large System	14	29
Small System	33	60
Both	27	50

- Employees found it difficult to transfer their job skills.
- Vendors viewed external training as a solution to the limitations of in-house training. Eighty-seven percent of the small-system vendors interviewed by INPUT fully reimburse their employees for external training and education; 67% of large-system vendors reimburse their employees in this area, as shown in Exhibits IV-11 and IV-12.
- Fifty percent of the large- and small-system vendors interviewed by INPUT offer competitive scholarships for their employees.
- Trade schools, two-year college programs, and four-year college programs offering degrees in computer equipment maintenance have experienced dramatic growth as the demand for field engineers has far surpassed the amount supplied by vendor in-house training programs. For example, between 1969 and 1979, the number of bachelors degrees in computer science increased 554%.
- Exhibit V-5 lists the number of associate degrees awarded between 1976 and 1981. This growth was the result of several factors:
 - An increase in the number of qualified instructors.
 - A continuing growth in the demand for field service personnel.
- INPUT estimates that even though the number of degree programs in field service will continue to rise, it will not keep up with the demand for graduates. Programs will continue to be plagued by the limited number of qualified instructors. (The instructor shortage is due to the inability of educational institutions to compete with industry for skilled teachers.)

EXHIBIT V-5

NUMBER OF ASSOCIATE DEGREES AWARDED IN DATA
PROCESSING EQUIPMENT MAINTENANCE



SOURCE: National Center for Educational Statistics

- As the supply of academically trained personnel becomes more limited, small-system vendors in particular will be forced to depend more on recruiting from competition to meet their basic training needs.

VI FIELD SERVICES STAFFING ISSUES

VI FIELD SERVICES STAFFING ISSUES

A. STAFFING LEVELS

- Field service staffing levels continued to rise in 1983 despite dismal economic conditions and the highest overall unemployment rate in 40 years. As shown in Exhibit VI-1, vendors are expecting the increase to continue through 1985.
- Vendors consistently reported that they regarded the market for field services as "recession proof." They cited two reasons for this:
 - The increase in the number of computers sold.
 - The continuing requirements for service of already-installed systems.
- Large-system vendors in Exhibit VI-1 are anticipating less-rapid growth in field service personnel than are small-system vendors (due primarily to slower growth in hardware shipments). INPUT projects that the demand for field service personnel will grow at 15% annually through 1987.
- The market for small systems (particularly "superminis") and small-business systems is expected to increase by 26% annually through 1987. Small-system vendors are preparing for this growth by increasing their field service personnel, as shown in Exhibit VI-1.

EXHIBIT VI-1

DIRECT LABOR TURNOVER

VENDOR TYPE	AVERAGE NUMBER INCREASED (Per Company)	
	1983	1985
Small Systems	21.6	42.2
Large Systems	20.3	24.0
Both	21.2	36.7

B. SOURCES OF NEW EMPLOYEES

- Exhibit VI-2 lists the average number of field service personnel hired in 1983 and 1985. As noted above, small-system vendors will be hiring more field service employees as the vendors' overall market share increases.
- Exhibit VI-3 lists the sources of new employees used by large-system vendors. Vendors prefer sources (competition, trade schools, and employee referral) that provide the most practical experience. Conversely, potential employees (from apprenticeship and four-year college programs) with little or no practical experience are not valued highly by large-system vendors.
- Large-system vendors consistently felt that possible future sources of new employees were less important than the sources they used now. Of the top sources, only employee referrals will remain as important in 1985 as they were in 1983. Large-system vendors prefer employee referrals because this method provides the most experienced and reliable new employees.
- Exhibit VI-4 lists sources of new employees for small-system vendors. Sources used by small-system vendors differ from those of large-system vendors in several important ways:
 - The importance level of most sources of new employees for small-system vendors will be growing in the future. This reflects the growth of the small-system market in general.
 - Small-system vendors will be much more aggressive in their recruitment efforts. Headhunters and advertising (both listed in the "other" category) will be important sources of new employees for these vendors.

EXHIBIT VI-2

FIELD SERVICE PERSONNEL HIRED

VENDOR TYPE	Average Number Increased (Per Company)	
	1983	1985
Small System	29.8	54.0
Large System	33.3	42.7
Both	31.0	50.8

EXHIBIT VI-3

SOURCES OF NEW EMPLOYEES BY LEVEL OF IMPORTANCE – LARGE-SYSTEM VENDORS

SOURCE OF NEW EMPLOYEES	1983 RATING*	1985 RATING*
Employee Referrals	7.3	7.3
Trade Schools	7.0	5.8
Competition	7.0	5.5
Military Schools	5.5	3.0
Other Divisions in Company	5.3	5.7
Two-Year College Programs	5.0	5.0
Four-Year College Programs	3.7	4.0
Apprenticeship Programs	1.0	1.0
Other	3.0	3.0

* Rating: 1 = Low, 10 = High

EXHIBIT IV-4

SOURCES OF NEW EMPLOYEES BY LEVEL OF IMPORTANCE – SMALL SYSTEM VENDORS

SOURCE OF NEW EMPLOYEES	1983 RATING*	1985 RATING*
Employee Referrals	7.2	7.2
Military Schools	6.4	6.4
Competition	6.0	6.3
Trade Schools	5.9	6.1
Other Divisions in Company	5.3	5.3
Two-Year College Programs	4.4	5.1
Four-Year College Programs	4.2	4.3
Apprenticeship Programs	2.0	2.8
Other	6.6	6.6

* Rating: 1 = Low, 10 = High

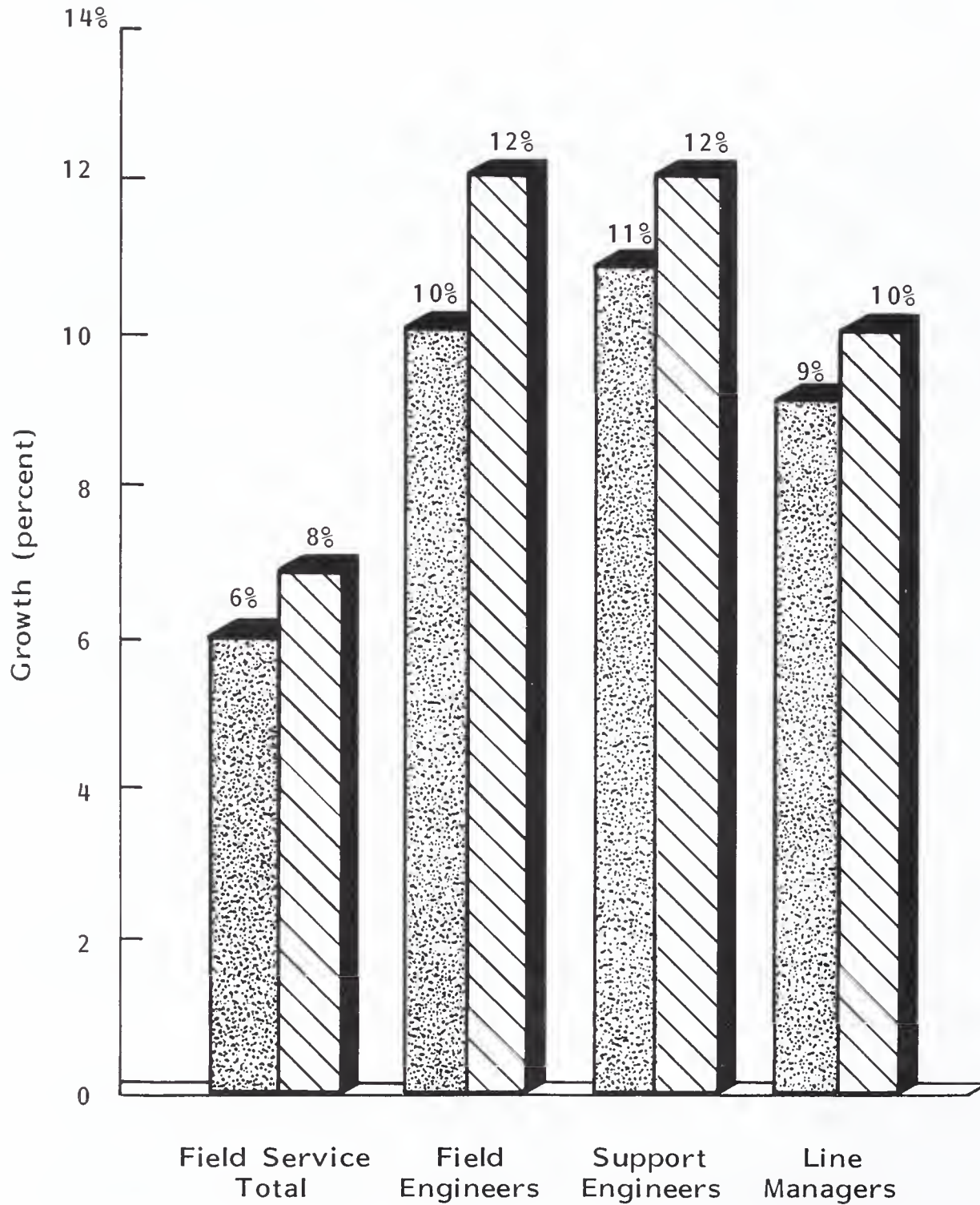
- As noted in the training and education section (Chapter V), many small-system vendors are not able to maintain extensive training programs for their staff. Consequently, recruiting experienced field service personnel from external sources will become vital to these vendors.
- Exhibit VI-5 lists staffing-level increases by job category for large- and small-system vendors combined. Vendors expect moderate increases in staffing in 1983-1984.
- Staffing, particularly field engineers, is expected to increase substantially by 1985. Exhibit VI-6 lists the average increase in field engineers for large- and small-system vendors (combined) between 1981 and 1985. Vendors interviewed by INPUT reported that they expect to hire an average of twice as many FEs in 1985 as they did in 1982. They cited improved economic conditions and increasing sales as the reasons for the increase in hiring.

C. TURNOVER

- The average number of field service personnel leaving the company is listed in Exhibit VI-7. The numbers for both large- and small-system vendors are relatively small and reflect the belief by vendors that there will not be a massive labor turnover in the next two to three years.
- While the overall number of personnel leaving field service departments may be small, their reasons for leaving are important indicators of industry trends. Exhibit VI-8 lists the reasons given by employees for leaving field service departments and/or companies.
- Large-system vendors interviewed by INPUT cited "released by company" as the major reason for field service personnel leaving the company. Small-system vendors cited this reason in only 10% of the cases. This is significant

EXHIBIT VI-5

AVERAGE STAFFING LEVEL INCREASES –
LARGE- AND SMALL-SYSTEM VENDORS COMBINED



= 1982/1983



= 1983/1984 (INPUT estimate)

EXHIBIT VI-6

FIELD ENGINEERS GAINED (NET)
SMALL- AND LARGE-SYSTEM VENDORS COMBINED

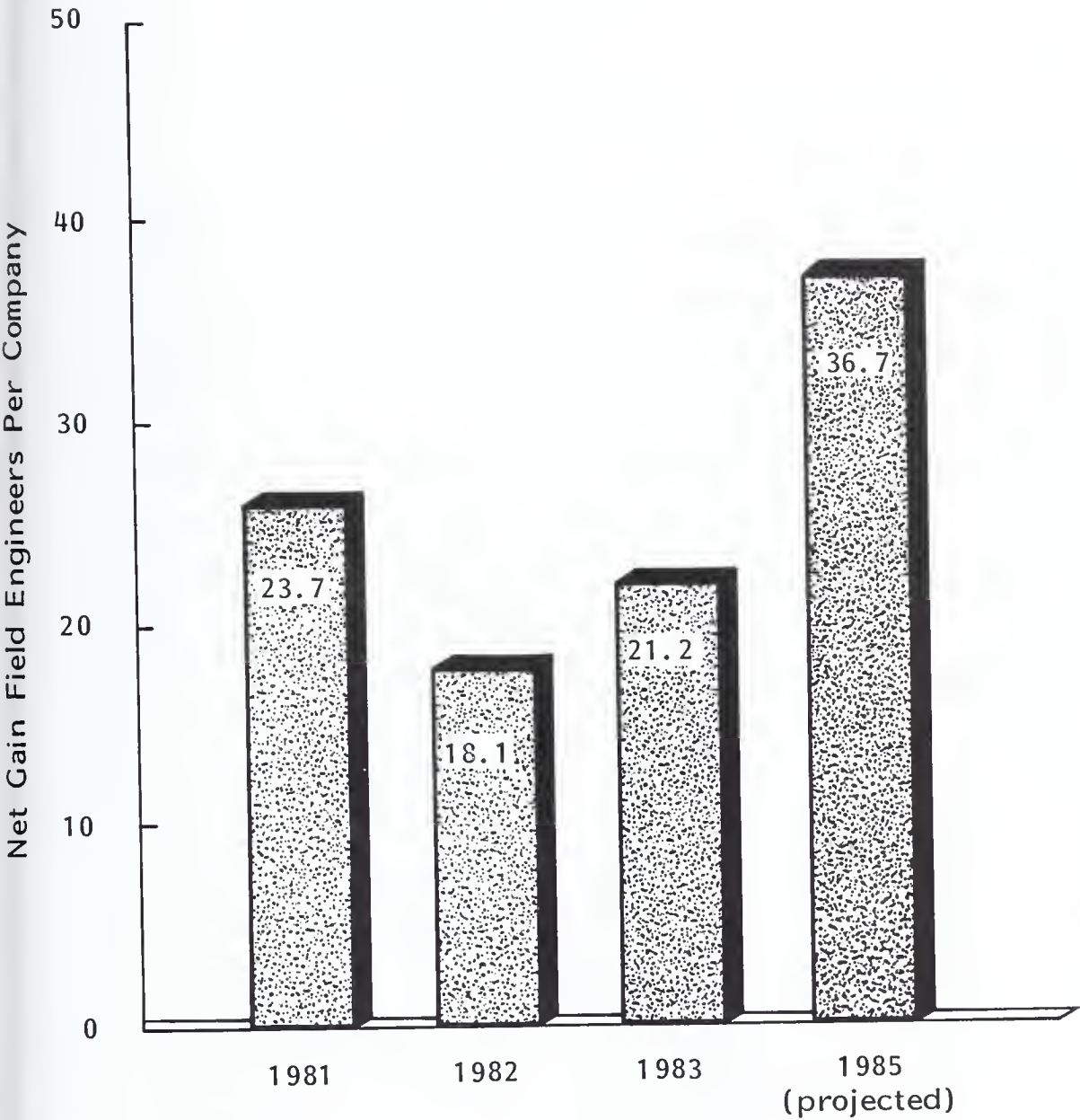


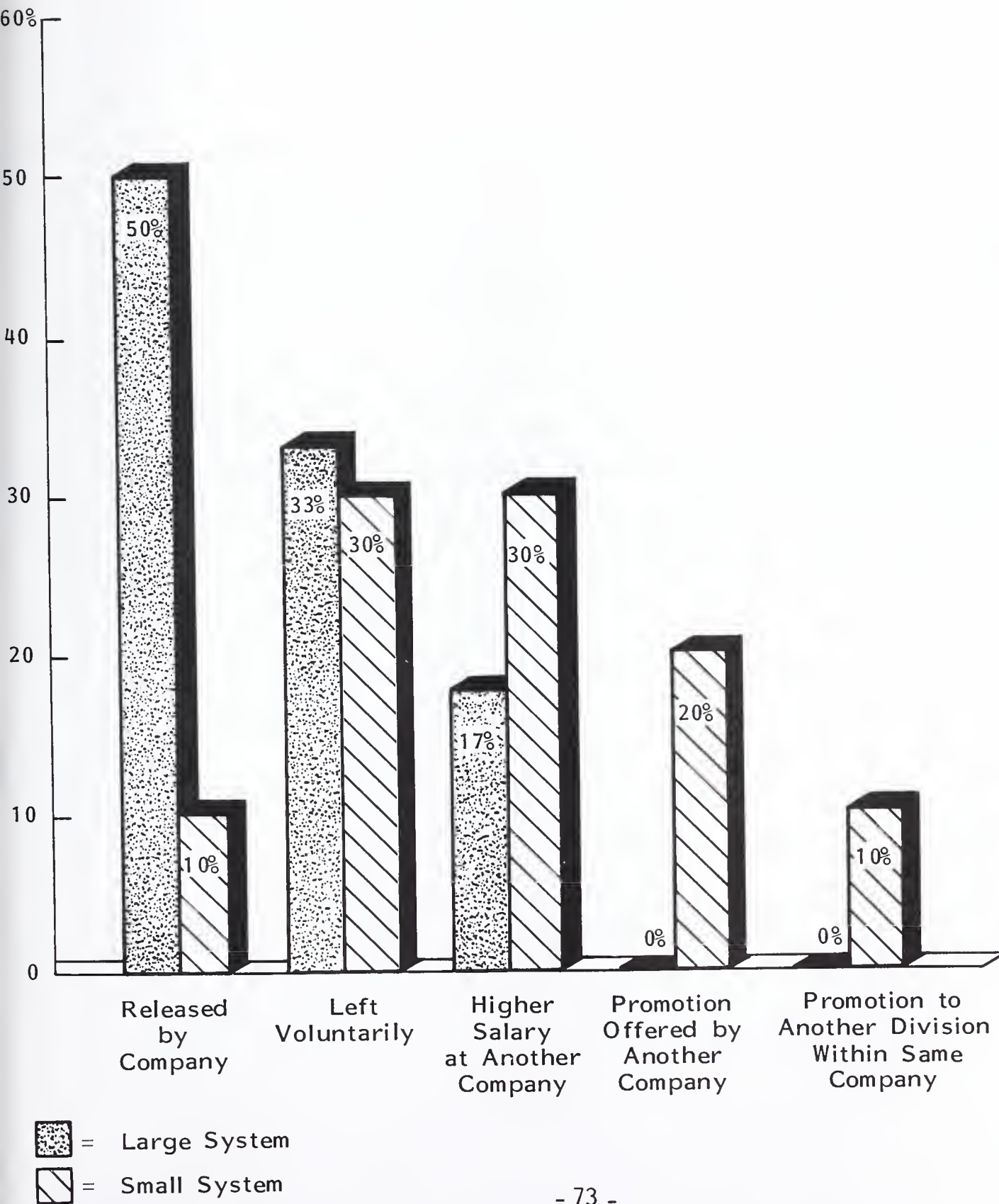
EXHIBIT VI-7

FIELD SERVICE PERSONNEL LEAVING COMPANY

VENDOR TYPE	AVERAGE NUMBER LEAVING COMPANY	
	1983	1985
Small System	8.2	11.8
Large System	13.0	18.7
Both	9.8	14.1

EXHIBIT VI-8

REASONS FOR LEAVING FIELD SERVICE DEPARTMENT OR COMPANY



because it demonstrates that a substantial number of large-system field service employees are not being drawn away from the company by competition, but are being dismissed by the company for its own reasons.

- Small-system vendors are losing 60% of their field service personnel to both interdepartmental and external competition. Of this 60%, one-half are leaving for a higher salary and the other half for promotions. On the other hand, only 17% of large-system field service employees left for a higher salary or promotion.
- Overall, most of the large-system vendors interviewed by INPUT anticipate a reduced growth in field service personnel. The remaining staff will tend to be highly experienced and motivated to remain with their company. Job security, and improved compensation and benefits will be the major stabilizing influences on large-system field service staffing levels.
- Small-system vendors will be increasing their staffing levels substantially in the next three to five years. A major concern expressed by vendors is the potential lack of qualified field service personnel. Increased training (see Chapter V) will help to alleviate this problem, but, in the short term, increased competition for FEs cannot be avoided.

VII CONCLUSIONS AND RECOMMENDATIONS

VII CONCLUSIONS AND RECOMMENDATIONS

A. PERSONNEL MANAGEMENT STRATEGIES

- With increased use of modularization, remote diagnostics, user self-diagnosis, and user self-maintenance, plus the impending change to a broader group of after-sales support responsibilities, the role of the field service engineer will change from systems support to that of sole source of client support. The FE's duties have changed from on-site diagnosis and repairs at the system level to remote diagnostics and component and board exchange. These duties will now be widened to include consulting, training, and possibly some limited sales functions.
- Vendors are already showing the effects of this change, namely the broadening range of salaries, especially at the lower ranges, and the increasing staff in the less-skilled positions. These trends should continue in the future, as the skill levels of the field engineer change.
- In addition to the broadening of salaries, vendors must reassess training, compensation, and FE career path goals because these factors affect overall staffing level trends and the "total service" concept.

B. STAFFING-LEVEL TRENDS

- Field service staffing-level trends are, and will continue to be, remarkably different for small- and large-system vendors. Large-system vendors are beginning to consolidate their staff in order to make their established field service organizations more profitable. Small-system vendors, on the other hand, are growing dynamically. Their objective in the next three to five years will be to create a much larger field service work force that has the skills to meet service needs and at the same time the potential to make this a profit center.
- Large-system vendors currently have the best and the worst of the field service worlds. They have a highly trained and experienced work force that is well organized and highly motivated. However, this work force is paid more than the average, receives more benefits, and has a skill level that is beyond what will be required in the future.
- In trying to adapt to future service requirements, large-system vendors will be replacing employees that are lost through attrition and company-initiated work force reductions with employees that possess different skill levels. There will be increasing emphasis on improved communication and personal interaction skills, and decreased emphasis on technical product knowledge.
- Senior-level field engineers should be moved into positions that take full advantage of their extensive maintenance skills. For example, an FE with comprehensive knowledge of a particular tape drive can act as a district resource person for less-experienced FEs. This arrangement will improve the overall level of service offered by general FEs and will provide career growth opportunities for senior FEs.
- Small-system vendors must prepare for a rapidly growing demand for field service personnel at all levels. This increasing demand will be the result of

growth not only in the small-system market, but also in the peripheral/terminal and office product markets.

- A second factor that will affect small-system staffing levels is the easing of recessionary restrictions on employment. Several vendors commented that as the economy improves and companies withdraw de facto hiring freezes, the pent-up demand for job changes will become much more evident.
- As a result of these two destabilizing influences on staffing levels, small-system vendors should prepare for aggressive tactics in the retention of their field service personnel and the acquisition of necessary service staff. INPUT recommends a two-pronged approach to the maintenance of necessary field service staffing levels:
 - Increased support for internal and external training.
 - Improved compensation, particularly in the area of benefits and incentives.

C. TRAINING

- Training is going to be an essential element in the development of large- and small-system field service personnel. Small-system vendors, in particular, will have to place more emphasis on in-house training in order to maintain adequate field service staffing levels. Large-system vendors must adapt their already-extensive training programs to the fundamental changes taking place in field service.
- Both in-house and external training of field service staff must take into account the changing role of field service. There will be less system-level knowledge required as changes in diagnostic and repair techniques necessitate

changes in training. Training will emphasize a greater variety of products (both hardware and software) but require less product/technical specialization. Increased training in interpersonal skills (e.g., after-sales support) is likely.

- Vendors will find increased training to be crucial in three areas of field service:
 - Systems and applications software support.
 - Management development.
 - Competitive products.
- The integration of software support into the field service hardware function will make training in software maintenance essential. In the next three to five years there will be more emphasis on training in systems software, but as users begin to require complete service on their bundled systems, the need for applications software maintenance training will grow.
- Vendors will be required to establish or expand either internal or external management development training as their field service staffs grow to meet the service needs of new products. Internal training will be in the form of workshops given by consultants; external training will emphasize university-level education.
- Large- and small-system vendors' management development programs should continue to grow in importance. The rapid growth in the industry has forced some vendors to look to external sources (namely competitors) for their managerial talent, but as the market develops and matures, vendors should look to internal sources for management.

- An added benefit of management development programs is the incentive it provides to employees, especially upper-level field engineers. By providing more promotion opportunities, management development programs will also reduce turnover.
- Vendors will need to stress interpersonal skills training in order to improve both field service engineer and field service management communications. As users become more involved in both diagnostic and self-maintenance activities, the quantity and, more importantly, quality of interaction between vendor and user will become crucial. Consequently, vendors should place more emphasis on communication skills when developing the field service staff.
- By increasing user contract and trust in the vendor, increased communications skills will aid field service involvement in sales support. In this fashion, users will still perceive the field service staff as unbiased sources of assistance, while vendors will have increased opportunities to make recommendations.

D. COMPENSATION

- Compensation, in the form of salary, benefits, and incentives, must be seen by field service employees as both competitive and fair. Many vendors commented that benefits such as hospitalization or sick leave have come to be regarded as standard throughout the industry. Companies offering substandard compensation packages are not likely to attract high-quality field service staff unless they can offer some type of nonquantifiable benefit (e.g., potential for future promotion) in return.
- A second effective compensation method is to tie the individual's success to the company's success. This has been a common practice with management-level employees (stock options, performance bonuses, etc.) but has not been

widely used for exempt and, particularly, nonexempt employees. Vendors must be careful to make this a "positive" program that rewards performance, rather than a "negative" plan which punishes failure.

- As networking and mixed-vendor shops become more prevalent, both large- and small-system vendors will be forced to train their field service staffs on the maintenance of competitive products. External education (colleges, trade schools, etc.) will not be up-to-date enough to serve as the primary source of training in this area. Internal training must be developed that is based on the long-term service goals of the company.
- Salary levels for the next three to five years are a more immediate concern for field service vendors. INPUT projects above-average increases for senior FEs and line managers. Basic technical personnel (trainees, support staff, and field engineers), however, will experience a slower-than-average salary growth rate as the skill level required for these positions decreases. Selected personnel, such as small-system software engineers, will remain in demand and their salaries will increase at substantially above-average rates.
- Incentives will vary according to the level of the employee within the organization. INPUT found that management and senior technical level employees will be motivated most by financial inducements such as stock options and performance bonuses. FEs and support staff are highly motivated by recognition awards and career-developing special projects. Performance for all field service staff - as noted above - will improve as individual incentives are more directly tied to company performance.
- Small-system vendors will use incentives for both retention and motivation of field service employees. Stock option and other "vesting" incentives/benefits will be used to create a long-term commitment to the company on the part of the employee. Performance bonuses will be used, as in large systems, to increase motivation and to promote necessary development in the role of field service personnel.

E. CHANGES IN CAREER PATHS

- A final issue affected by the changing role of the field engineer is the altered career paths available to field service personnel. In the past, promotions in field service were dependent to a greater extent on experience and technical expertise. In order to be successful in the diagnosis and repair of large systems, field engineers relied heavily on past experience on those particular systems. Therefore, the most successful engineers were heavily experienced and were used to having sole responsibility for diagnosis and repair.
- With the growing trend toward remote diagnostics, component and board exchange, user self-diagnostics, and user self-maintenance, the successful field engineer requires less systems-level knowledge and has more ability to interact with the user. Thus, promotions will be based not only on technical skill but also in interpersonal skills.
- In addition, field service management will require more communication skills. Users, now responsible for a certain amount of maintenance responsibility, will require assistance from the vendor. Promotion to managerial positions will require these increased communication skills.
- Vendors will need to look for managerial talent that possesses both technical and communication skills. At the start, this talent will be drawn from present employees that demonstrate communication ability. Experienced field engineers with promotable talent yet little interpersonal ability (or, for that matter, little desire to become line managers) can be moved to technical support and repair centers, where their technical expertise will be of much benefit to the company. In the next five years as vendors begin to stress the new personnel requirements, future line managers will be abundant within the field service workforce. In this fashion, the field service staff will reflect the "total service concept."

APPENDIX: VENDOR QUESTIONNAIRE

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APPENDIX

VENDOR QUESTIONNAIRE

A. General Management

1. Please check all of the direct services you currently offer or plan to offer in the near future.

DIRECT SERVICE OFFERED	1983	BY 1985	BY 1987
a) Third-party maintenance	_____	_____	_____
b) Facility maintenance management	_____	_____	_____
c) Guaranteed availability (uptime)	_____	_____	_____
d) Guaranteed response time	_____	_____	_____
e) Guaranteed repair time (hardware)	_____	_____	_____
f) On-site standby	_____	_____	_____
g) Variable shift coverage (versus fixed schedules)	_____	_____	_____
h) On-site spares	_____	_____	_____
i) Guaranteed turnaround on software repairs	_____	_____	_____
j) Remote diagnostics	_____	_____	_____
k) Preventive maintenance and field changes during nonprime hours	_____	_____	_____
l) System software maintenance	_____	_____	_____
m) Application software maintenance	_____	_____	_____
n) Depot maintenance (pickup)	_____	_____	_____
o) Depot maintenance (carry/mail)	_____	_____	_____
p) Local area network maintenance	_____	_____	_____

2. Please check the ancillary services your field service organization offers or plans to offer in the near future. Also, for those services you currently provide, please indicate the level of quality you believe that your users would give you. (Scale of 1-10: 10 = excellent, 5 = average, 1 = very poor.)

ANCILLARY SERVICES OFFERED	BY 1985	BY 1987	1983	ON A SCALE OF 1-10, USERS WOULD RATE YOU
a) Environmental planning	_____	_____	_____	_____
b) Physical site planning (layouts)	_____	_____	_____	_____
c) Consulting services (hardware)	_____	_____	_____	_____
d) Consulting services (software)	_____	_____	_____	_____
e) Customer training	_____	_____	_____	_____
f) Installation management and coordination	_____	_____	_____	_____
g) Supplies sales	_____	_____	_____	_____
h) Add-on sales (additional equipment)	_____	_____	_____	_____
i) Upgrade sales (new equipment or features)	_____	_____	_____	_____
j) Site audits	_____	_____	_____	_____
k) Facility relocation	_____	_____	_____	_____
l) De-installation	_____	_____	_____	_____
m) Software sales	_____	_____	_____	_____
n) Ancillary equipment sales and service	_____	_____	_____	_____

3. How do you rate your field service organization in the following categories, and how do you believe your users would rate you in the same categories? (Scale 1-10: 10 = excellent, 5 = average, 1 = very poor.)

CATEGORIES RATED: (service over the past 12 months)	RATING (1-10)	
	SELF RATING	EXPECTED USER RATING
a) Management's communication with users	_____	_____
b) Hardware service engineer's communication	_____	_____
c) Software service engineer's communication	_____	_____
d) Ability to diagnose hardware problems and to make quality repairs	_____	_____
e) Ability to maintain software	_____	_____
f) General responsiveness of the organization to user requirements	_____	_____
g) Overall service image	_____	_____
h) Taking initiative to improve user operations	_____	_____
i) Resolution of invoicing disputes	_____	_____
j) Dispatching trouble calls	_____	_____
k) Escalation procedures during extended outages	_____	_____

4. Please either respond to the following questions or provide us with a functional organization chart (space is provided on the reverse side of this page for your sketch if that is more convenient for you).

FUNCTION	(V) IF NOT FS	TITLE	REPORTS TO (title/function)
a) Top-level field service executive	_____	_____	_____
b) Top-level domestic line executive	_____	_____	_____
c) Top international line executive	_____	_____	_____
d) Field support, general	_____	_____	_____
e) Field support, hardware	_____	_____	_____
f) Field support, software	_____	_____	_____
g) Financial operations	_____	_____	_____
h) Administration	_____	_____	_____
i) Logistics	_____	_____	_____
j) Operations analysis	_____	_____	_____
k) Education	_____	_____	_____
l) Personnel	_____	_____	_____
m) Field service marketing	_____	_____	_____
n) Engineering liaison	_____	_____	_____
o) OEM liaison	_____	_____	_____
p) Legal	_____	_____	_____
q) Other _____	_____	_____	_____
r) Other _____	_____	_____	_____

5. Lower level management and employees are encouraged by some companies to participate in the following activities. Please check those that apply now and in the near future for your company. (Enc. = Encouraged, Mand. = Mandatory.)

ACTIVITIES	1983		1985		1987	
	ENC.	MAND.	ENC.	MAND.	ENC.	MAND.
a) Making good-will calls on users	_____	_____	_____	_____	_____	_____
b) Selling maintenance contracts	_____	_____	_____	_____	_____	_____
c) Accompanying sales personnel on sales calls	_____	_____	_____	_____	_____	_____
d) Attending sales meetings	_____	_____	_____	_____	_____	_____
e) Furthering formal education	_____	_____	_____	_____	_____	_____
f) Making public appearances	_____	_____	_____	_____	_____	_____
g) Joining organizations such as AFSM, Jaycees, etc.	_____	_____	_____	_____	_____	_____
h) Reading trade journals	_____	_____	_____	_____	_____	_____
i) Other _____	_____	_____	_____	_____	_____	_____
j) Other _____	_____	_____	_____	_____	_____	_____
k) Other _____	_____	_____	_____	_____	_____	_____

B. Field Support/Product Support

1. Please rate the trends of the influence of your field service management in the following company activities relative to small systems. (Scale of 1-10: 10 = excellent, 5 = average, 1 = very poor.)

ACTIVITIES	RATING (1-10)		
	1982	1983	EXPECTED 1984
a) Product specification	_____	_____	_____
b) Product design	_____	_____	_____
c) Serviceability design	_____	_____	_____
d) Documentation	_____	_____	_____
e) Diagnostic development	_____	_____	_____
f) Selection of test equipment	_____	_____	_____
g) Spares requirements	_____	_____	_____
h) Geographic control of sales	_____	_____	_____
i) Exceptions to standard maintenance agreements	_____	_____	_____
j) Product performance objectives	_____	_____	_____
k) Quality control in manufacturing	_____	_____	_____
l) OEM acceptance criteria	_____	_____	_____
m) Customer education	_____	_____	_____

2. Please indicate the level that small system software support has been or will be integrated into the hardware support structure. (0% = no field service responsibility, 100% = fully integrated responsibility.)

SOFTWARE SUPPORT ACTIVITY	PERCENT INTEGRATED			
	1982	1983	1985	1987
a) System control programs at headquarters support level	____%	____%	____%	____%
b) System control programs in the field	_____	_____	_____	_____
c) Compilers and system utilities at headquarters	_____	_____	_____	_____
d) Compilers and system utilities in the field	_____	_____	_____	_____
e) Applications software developed, sold, or distributed by your company - headquarters support	_____	_____	_____	_____
f) Applications (as in "e" above) in the field	_____	_____	_____	_____
g) Maintenance of third-party software, including user's, at headquarters level	_____	_____	_____	_____
h) Maintenance of third-party software in the field	_____	_____	_____	_____

3. Please describe your field support or support center structure as it relates to:

a) User support requirements when users are involved via remote diagnostics.

b) User support requirements when users are assisted through preliminary stages of problem determination.

3. (Continued)

c) Support of on-site field personnel via telephone and/or remote diagnostics.

d) Physical, on-site support to field personnel (please discuss criteria):

4. Please provide the objectives and actuals in product performance for the most active small systems serviced by your organization.

MODEL NUMBER OR NAME OF MAINFRAMES	MEAN TIME TO REPAIR (hours)		MEAN TIME BETWEEN FAILURES (hours)		AVERAGE AVAILABILITY (percent)		MEAN TIME TO RESPOND (hours)	
	OBJ.	ACT.	OBJ.	ACT.	OBJ.	ACT.	OBJ.	ACT.
a) <div></div>								
b) <div></div>								
c) <div></div>								
d) <div></div>								
e) <div></div>								

5. Please check the following items that apply in your field support organization (even if applicable to only one product currently serviced in the field). If not presently implemented, please indicate year scheduled.

	CURRENTLY IMPLEMENTED? YES/NO	YEAR SCHEDULED
a) Remote diagnostics	_____	_____
b) Centralized dispatching	_____	_____
c) Modular, plug-in units for user to deliver to repair centers	_____	_____
d) Real-time incident reporting	_____	_____
e) Real-time IR (parts usage included)	_____	_____
f) Signature analysis (field)	_____	_____
g) Regional repair centers	_____	_____
h) Third-party repair centers	_____	_____
i) Third-party on-site maintenance	_____	_____
j) User support centers	_____	_____

6. a) What has been the trend in your capital investment in small system spare parts inventories for the years indicated below? Please respond by percentage of gross service revenues derived from support of small systems.

YEAR OF MEASUREMENT	PERCENT OF GROSS SERVICE REVENUES FOR YEAR
1981	_____ %
1982	_____ %
1983 (most recent inventory)	_____ %
1984 (projected)	_____ %
1985 (projected)	_____ %

- b) To what most significant factors do you contribute the changes, i.e., growth of installed base, regional spares depots, regional repair centers, reliability of new products, etc.?

Comment: _____

7. a) Have you announced or have you set a policy on the maintenance and support of local area networks serving competitive products? Yes/No _____

b) If yes, please comment on your position.

c) If no, do you have any general comment on the subject of local area networks without making a policy statement?

C. Financial/Administrative Operations

1. How do you measure changes in field service productivity when measuring the effectiveness of changes in operating methods or investment in capital improvements?

MEASUREMENT METHOD:	YES/NO
a) Ratio of gross revenue carried per field service person per month	_____
b) Ratio of personnel to equipment by category of equipment	_____
c) Ratio of personnel to management	_____
d) Net ratio of expenses to revenue after cost of improvement	_____
e) Other _____	_____
_____	_____
_____	_____

2. What levels of productivity have you realized in servicing small systems for the following? (Please classify measurement using a-e in question 1 above.)

IMPROVEMENT	MEASUREMENT METHOD (a-e)	PRODUCTIVITY IMPROVEMENT (percent)
a) Remote diagnostics	_____	_____
b) Repair centers	_____	_____
c) Regional parts depots	_____	_____
d) Centralized dispatch	_____	_____
e) Support centers	_____	_____
f) Field education	_____	_____
g) Cross training	_____	_____
h) Multiple territory assignments	_____	_____
i) Other _____	_____	_____
_____	_____	_____
_____	_____	_____

3. Please indicate the percentage of total operating revenues credited to the field service division coming from the following categories. (If fiscal is different from calendar, please supply FY dates.)

SOURCE OF REVENUE CREDITS	PERCENT OF TOTAL REVENUE		
	1982	1983	1984
a) Equipment warranty credits	_____ %	_____ %	_____ %
b) Basic period contracts for maintenance	_____	_____	_____
c) Extra shift premium	_____	_____	_____
d) Time and material (labor)	_____	_____	_____
e) Time and material (parts)	_____	_____	_____
f) Third-party contracts	_____	_____	_____
g) Installation charges	_____	_____	_____
h) De-installation charges	_____	_____	_____
i) Technical consulting	_____	_____	_____
j) Management consulting	_____	_____	_____
k) Parts repairs	_____	_____	_____
l) Parts sales	_____	_____	_____
m) Supplies sales	_____	_____	_____
n) Sales of ancillary equipment	_____	_____	_____
o) Maintenance of ancillary equipment	_____	_____	_____
p) Sales of software products	_____	_____	_____
q) Maintenance of software products	_____	_____	_____
r) Revenues from other divisions	_____	_____	_____
s) Other _____	_____	_____	_____
t) Other _____	_____	_____	_____
u) Other _____	_____	_____	_____

4. Please indicate the percentage of total field service division expenses in the following categories (and supply FY dates if different from calendar year).

EXPENSE LINE ITEM	PERCENT OF TOTAL EXPENSES [use () to indicate credit]		
	1982	1983	1984
a) Basic direct labor, wages, salaries	_____	_____	_____
b) Direct labor overtime shift premiums and standby pay	_____	_____	_____
c) Support personnel salaries	_____	_____	_____
d) Management and administrative salaries and premiums	_____	_____	_____
e) Benefits programs	_____	_____	_____
f) Net parts usage	_____	_____	_____
g) Inventory variances	_____	_____	_____
h) Depreciation	_____	_____	_____
i) Travel (includes auto leases)	_____	_____	_____
j) Relocation	_____	_____	_____
k) Education	_____	_____	_____
l) Equipment rental/lease	_____	_____	_____
m) Office, warehouse space	_____	_____	_____
n) Communications	_____	_____	_____
o) Interdivisional transfers	_____	_____	_____
p) Logistics, repair depot, and other expenses not reported above	_____	_____	_____
q) Corporate general and administrative allocation (overhead)	_____	_____	_____
r) Other significant categories	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

5. Please check any of the following interdivisional transfers of revenues and expenses between your field service division and other departments, and indicate whether they are treated as revenue or expense items by checking the appropriate columns. (Check all columns that apply.)

INTERDIVISIONAL TRANSFERS OF ITEMS	REVENUE (FE)		EXPENSE (FE)	
	CREDIT (✓)	DEBIT (✓)	CREDIT (✓)	DEBIT (✓)
a) Warranty of equipment	_____	_____	_____	_____
b) Spare parts used during warranty	_____	_____	_____	_____
c) Direct labor during warranty	_____	_____	_____	_____
d) Sales assistance	_____	_____	_____	_____
e) Maintenance sales commissions	_____	_____	_____	_____
f) Manufacturing assistance	_____	_____	_____	_____
g) Engineering assistance	_____	_____	_____	_____
h) Extended warranties	_____	_____	_____	_____
i) Nonstandard contract terms, e.g., on-site engineers	_____	_____	_____	_____
j) Defective spare parts	_____	_____	_____	_____
k) Sales changes to equipment	_____	_____	_____	_____
l) Safety changes	_____	_____	_____	_____
m) Engineering changes	_____	_____	_____	_____
n) Other _____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

6. Please supply the figures as indicated for your overall financial performance (indicate fiscal year if different from calendar year).

FINANCIAL PERFORMANCE	FISCAL YEAR END _____			
	1982	1983	1984	1987
a) Field service revenue (\$ millions)	_____	_____	_____	_____
b) Field service expenses (\$ millions)	_____	_____	_____	_____
c) Pretax profit (percent)	_____	_____	_____	_____
d) Revenue per field service engineer (direct labor)	_____	_____	_____	_____
e) Direct expense per field service engineer (direct labor)	_____	_____	_____	_____
f) Fully burdened expense per field service engineer (direct labor)	_____	_____	_____	_____
g) Basic hourly rate charged for service	_____	_____	_____	_____
h) Fully burdened field service expense per field service employee (all categories)	_____	_____	_____	_____

7. Please comment below on service to remote customers: zone charges, response times, etc.

a) Zone definitions:

Primary zone 0 — miles

Zone 2 — miles

Zone 3 — miles

Other criteria: _____

b) Zone premiums added to basic maintenance charges: _____

c) Response time targets for zones: _____

d) Other comments: _____

8. a) Please describe the methodology your company uses to set small system maintenance prices (percent of purchase tested against cost of service projection, etc.):

- b) At what ratio of basic maintenance price to list price do you believe that:

i) Small system users will actively consider alternative sources	_____ %
ii) Small system users will definitely contract third party or maintain own equipment	_____ %
iii) Users will refuse to buy the original product, given the option	_____ %

- c) How frequently have you and do you expect to change prices of maintenance for:

	FREQUENCY OF CHANGE (months)			
	1982	1983	1984	1985
i) Small systems	_____	_____	_____	_____
ii) Basic hourly rates	_____	_____	_____	_____
iii) Shift differential	_____	_____	_____	_____

- d) Do you offer discounts for:

	PERCENT DISCOUNT
i) User assistance in remote diagnostics	_____ %
ii) User replacement of plug-in modules or units	_____ %
iii) User delivery of plug-in modules or units to repair center	_____ %
iv) Relaxed requirement on response time	_____ %
v) User purchase of spare parts kits	_____ %
vi) Other: _____	_____ %

9. Contract administration:

a) Are your maintenance contracts: (i) automatically renewed _____ or (ii) negotiated each renewal cycle? _____

b) What is the length of your normal contract? _____ (months)

c) Do you normally invoice (i) monthly _____, (ii) quarterly _____, (iii) semiannually _____, (iv) annually _____, (v) other _____.

d) Do you invoice for exceptions (time and material, etc.) at a different time than your normal cycle?
Yes/No _____ If yes, please describe:

e) Who is responsible for maintenance contract:

i) Negotiation _____

ii) Renewal _____

iii) Administration _____

10. a) Has your field service division implemented a field quality assurance program or other formal operational audit? Yes/No _____

b) If yes, please describe: _____

11. What is the average cost breakdown of a typical fault call? (Please respond for products your company services.)

PRODUCT SERVICED	TOTAL COST (dollars)	DIRECT LABOR (percent)	TRAVEL (percent)	PARTS (percent)	OVERHEAD & SUPPORT
Large mainframes	_____	_____	_____	_____	_____
Medium mainframes	_____	_____	_____	_____	_____
Small systems	_____	_____	_____	_____	_____
Peripherals	_____	_____	_____	_____	_____
Terminals	_____	_____	_____	_____	_____
Word processors	_____	_____	_____	_____	_____
Personal computers	_____	_____	_____	_____	_____
Copiers, facsimile	_____	_____	_____	_____	_____
Work stations	_____	_____	_____	_____	_____
PABX, PBX	_____	_____	_____	_____	_____
Teleprocessing/communications	_____	_____	_____	_____	_____

D. Personnel

1. Please identify your sources of new employees and rate them on a scale of 1-10. (1 = little or no importance, 10 = highest importance.)

SOURCE OF NEW EMPLOYEES	RATING (1-10)			
	1982	1983	1984	1987
a) Competition	_____	_____	_____	_____
b) Trade schools	_____	_____	_____	_____
c) Military schools	_____	_____	_____	_____
d) Two-year college programs	_____	_____	_____	_____
e) Four-year colleges	_____	_____	_____	_____
f) Apprenticeship programs	_____	_____	_____	_____
g) Other division in company	_____	_____	_____	_____
h) Employee referrals	_____	_____	_____	_____
i) Headquarters	_____	_____	_____	_____
j) Other: _____	_____	_____	_____	_____

2. Do you provide in-company formal training for:

	YES/NO
a) Indoctrination	_____
b) Basic training (apprentice level)	_____
c) Product (technical)	_____
d) Systems software (system)	_____
e) Applications software	_____
f) Management development	_____
g) Technological upgrading	_____

3. Do you fully (F) or partially (P) reimburse or otherwise provide financial support for:

	F/P
a) University courses	_____
b) Out-company seminars in management development	_____
c) Professional association membership	_____
d) Purchase of company stock	_____
e) Professional trade journals	_____
f) Matching grants to educational institutions	_____
g) Children's higher education	_____
h) Out-company training in professional (technical) development	_____
i) Nonexempt employee relocation	_____
j) New-hire relocation	_____
k) Exempt employee relocation	_____
l) Lease or purchase of automobiles to be used for business	_____
m) Lease or purchase of company products (micros, minis, personal computers, typewriters, etc.)	_____
n) Other: _____	_____
_____	_____
_____	_____

4. Do your personnel policies and procedures provide for the following employee benefits and assurances? (Y/N)

FRINGE BENEFITS	EXEMPT		NONEXEMPT	
	1983	BY 1985	1983	BY 1985
a) Life insurance	_____	_____	_____	_____
b) Hospitalization	_____	_____	_____	_____
c) Major medical (80% or better)	_____	_____	_____	_____
d) Limited medical (out patient)	_____	_____	_____	_____
e) Dental	_____	_____	_____	_____
f) Eyesight/glasses	_____	_____	_____	_____
g) Retirement	_____	_____	_____	_____
h) Disability insurance	_____	_____	_____	_____
i) Matched savings	_____	_____	_____	_____
j) Profit-sharing	_____	_____	_____	_____
k) Paid sick leave	_____	_____	_____	_____
l) Grievance procedures	_____	_____	_____	_____
m) Improvement programs for marginal performers	_____	_____	_____	_____
n) Exit interviews	_____	_____	_____	_____
o) Appraisal and counseling	_____	_____	_____	_____
p) Career path definitions	_____	_____	_____	_____
q) Pay for performance guidelines	_____	_____	_____	_____

5. Does your company provide incentives for field service employees? (Indicate by check mark.)

INCENTIVES	MANAGEMENT		EXEMPT		NONEXEMPT	
	1983	BY 1985	1983	BY 1985	1983	BY 1985
a) Stock options	_____	_____	_____	_____	_____	_____
b) Performance bonuses	_____	_____	_____	_____	_____	_____
c) Suggestion awards	_____	_____	_____	_____	_____	_____
d) Periodic recognition awards ("FE of the quarter," etc.)	_____	_____	_____	_____	_____	_____
e) Special projects, foreign assignments, etc.	_____	_____	_____	_____	_____	_____
f) Award conferences, trips	_____	_____	_____	_____	_____	_____
g) Competitive scholarships for employees or family	_____	_____	_____	_____	_____	_____
h) Other: _____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____

6. a) How many direct labor field service personnel were hired in the following years?

1982 _____

1983 _____ (forecast)

1984 _____ (forecast)

b) How many direct-labor field service personnel left your company in:

1982 _____

1983 _____ (forecast)

c) What percentage of the persons leaving leave for the following reasons:

	1982	1983
i) Voluntary, no reason given	_____ %	_____ %
ii) Left for higher salary, better total compensation	_____	_____
iii) Released for company reasons	_____	_____
iv) Promotion in another company	_____	_____
v) Relocation by another company	_____	_____
vi) Promoted within own company	_____	_____
vii) Transferred to foreign subsidiary or other division	_____	_____
viii) Other _____	_____	_____
Total	_____ 100%	_____ 100%

d) Staffing levels:

U.S. EMPLOYEES	1983	1984
i) Total employees in company	_____	_____
ii) Total in field service division	_____	_____
iii) Number of direct-labor FEs	_____	_____
iv) Number of field support engineers	_____	_____
v) Number of field supervisors	_____	_____
vi) Number of managers in field	_____	_____
vii) Line managers at headquarters	_____	_____
viii) FE staff managers (total)	_____	_____
ix) FE staff personnel (nonmanagement including administration)	_____	_____

7. 1983 annual salaries, small system field engineers (front-line product field service technicians)

JOB DESCRIPTION	TITLE	(✓) EXEMPT	NUMBER IN U.S.	RANGE		AVERAGE PAID (actual)	AVERAGE GAIN OVER 1982 (percent)
				MAXIMUM	MINIMUM		
a) Entry-level trainee for hardware maintenance		()					%
b) Entry-level trainee in software maintenance		()					%
c) Minimum experience level qualified to respond to trouble calls, generally requires assistance		()					%
d) Qualified field service technician carries territory, requires occasional assistance, renders some aid to lower levels		()					%
e) Senior-level field service technician: generally gives more assistance than received, assigned field training duties to assist in development of first two categories (above)		()					%
f) Qualified field service engineer in software support		()					%
g) Senior level software support in field							
h) Top-level hardware specialist located in field office		()					%
i) Top-level software specialist located in field office		()					%

8. 1983 annual salaries, field office staff personnel

JOB DESCRIPTION	TITLE	(✓) EXEMPT	NUMBER IN U.S.	RANGE		AVERAGE PAID (actual)	AVERAGE GAIN OVER 1982 (percent)
				MINIMUM	MAXIMUM		
a) Repair depot, repair technician trainee		()					%
b) Repair depot, repair technician		()					%
c) Senior-level repair depot technician		()					%
d) Office administrator, Jr.		()					%
e) Office administrator, Sr.		()					%
f) Field service supervisor may work approximately 50/50 on equipment and management		()					%
g) First-line manager of field service engineers		()					%
h) Second-line manager located in field offices		()					%
i) Staff manager in education and field support		()					%
j) Staff manager in operations and financial analysis		()					%
k) Field service administration manager		()					%
l) Field service personnel manager		()					%

